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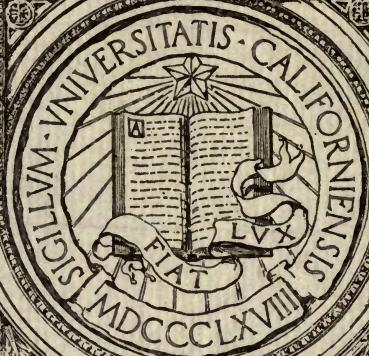


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FLOODS AND FLOOD PROTECTION

REFERENCES TO BOOKS AND MAGAZINE ARTICLES

Reprinted from the Monthly Bulletin, July 1908



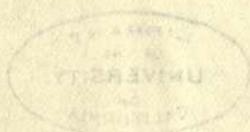
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Floods and Flood Protection

This list on floods has been compiled at the suggestion of the Flood Commission of the Chamber of Commerce of Pittsburgh, to form a guide to the printed matter available on the subject. It covers practically all the useful material in this Library at the present time. In its compilation the selection has been restricted closely to the subject indicated by the title. It does not include articles on dams, reservoir construction, river hydraulics, river improvements for purposes of navigation, land reclamation or irrigation, except when specific reference is made to flood abatement.

No attempt has been made to spell titles uniformly, but the spelling of the original has been followed in each case.

The following abbreviations have been used:

- diag. diagrams.
- dr. drawings.
- ed. edition.
- ill. illustrations.
- n. s. new series.
- no. number.
- p. page or pages.
- pl. plates.
- ser. series.
- v. volume.
- w. words.

The work of compilation and proof revision has been done by Mr E. H. McClelland of the Technology department.

HARRISON W. CRAVER,
Technology Librarian

May 28, 1908

Bibliographies and Indexes

The indexes grouped here contain references to many individual streams which it has been impracticable to bring out separately in the general list.

Connor, William D.

Application of the reservoir system to the improvement of the Ohio river. 6,300 w. 1908. (In *Engineering news*, v.59, p.621.)
"References," p.624.

Floods and inundations. 400 w. 1903. (In *Encyclopedia Americana*, v.7, under "Floods.")

List of about 50 of the most disastrous floods, A. D. 684-1903.

The same [A. D. 684-1893]. 1901. (In *Chambers's encyclopædia*, new ed., v.4, p.682.)

Hollister, George Buell, & Leighton, Marshall Ora.

Passaic flood of 1902. 56 p. 11 diag. 15 pl. 1903. (In United States—Geological survey. Water-supply and irrigation papers, no.88.) Index, p.55-56.

Serious flood in northern New Jersey in February and March 1902. Region affected contains approximately one-third of the population of the entire state.

"This investigation into the most disastrous flood ever known in the Passaic valley is of timely interest to all classes of citizens dwelling on lowlands subject to floods." *From letter of transmittal.*

Hoyt, John C. & Wood, B. D.

Index to the hydrographic progress reports of the United States geological survey, 1888 to 1903. 253 p. 1905. (In United States—Geological survey. Water-supply and irrigation papers, no.119.)

Very full index by names of regions, towns, creeks and rivers. The information indexed is mainly on rainfall, discharge, gage heights and water-power.

Inundation. 1,500 w. 1903. (In New international encyclopædia, v.10, p.116.)

"Bibliography," p.118.

Nature of principal sea and river floods.

McClure, John, comp.

Analytical and topical index to the reports of the chief of engineers and officers of the corps of engineers, United States Army, 1866-1900. 3v. 1,788 p. 1903.

Volumes 1-2 deal with river and harbor works. Alphabetical arrangement under name of stream or harbor; fully cross-indexed. Gives chronological data relating to each work, usually under the following titles: appropriations, commerce, contracts, engineers, legislation, obstructions, operations, physical characteristics, private work, projects and surveys.

Murphy, Edward Charles.

Destructive floods in the United States in 1903. 81 p. 2 maps. 13 pl. 1904. (In United States—Geological survey. Water-supply and irrigation papers, no.96.)

Index, p.79-81.

"The year 1903 will long be remembered for its extreme local variations from normal climatic conditions. A cloud burst at Heppner, Oreg...a tornado and an excessive rainfall at Gainesville, Ga...the excessive rainfall...in South Carolina...and tornadoes and excessive rainfall of the upper-central Mississippi valley and lower Missouri valley...resulted in the destruction of much property."

Murphy, Edward Charles, and others.

Destructive floods in the United States in 1904. 206 p. 19 dr. 18 pl. 1905. (In United States—Geological survey. Water-supply and irrigation papers, no.147.)

Index, p.195-206.

"The United States Geological survey has carried on a study of the water resources of the country for the past seventeen years and there is now available for the use of engineers and others interested a large mass of data bearing on the seasonal flow of the principal streams of the country. In this paper that part of these data which bears on the maximum rate of run-off of streams is brought together and a method is given for the determination of the waterway area of streams."

Geographical arrangement, usually considering in each section: precipitation, gage height and discharge of rivers, damage, and prevention of future damage.

Murphy, Edward Charles, and others.

Destructive floods in the United States in 1905, with a discussion

Murphy, Edward Charles, and others—continued.

of flood discharge and frequency and an index to flood literature. 105 p. 15 maps and pl. 1906. (In United States—Geological survey. Water-supply and irrigation papers, no.162.)

Index, p.103-105.

"Index to flood literature," p.88-101.

"Few lives were lost and the damage was small compared with that of some previous years."

The "Index to flood literature" is a cross-reference list of 14 closely-printed pages. Deals only with floods in the United States and is compiled almost wholly from reports of United States engineers, United States geological survey, and Rafter's "Hydrology of the state of New York." Floods are indexed both by stream and by principal places affected. Largely concerned with flood discharges.

Nelson, Knute, and others.

Report on the Mississippi river floods by the committee on commerce, United States Senate, pursuant to Senate resolution no.76, 55th congress, 1st session. 522 p. 1 ill. 4 maps. 21 pl. 2 tables. 1898. [published 1899.] (In United States—55th congress, 3d session. Senate report no.1433, v.2.)

Index, p.519-522.

The same, condensed. 2,500 w. (In Engineering news, v.41, p.50.)

The same, condensed. 6,500 w. (In Engineering record, v.39, p.184.)

Rafter, George W.

Hydrology of the state of New York. 902 p. 74 dr. 5 maps. 45 pl. 99 tables. 1904. [published] 1905. (In New York (state)—Museum. Bulletin no.85.)

Index, p.885-902.

"List of works referred to," p.875-883.

Revision of "Water-supply and irrigation papers," no.24 and 25, published in 1899. Besides his connection with the United States geological survey, the author has conducted investigations for Board of Engineers on Deep Waterways, been consulting engineer to the Canal Committee, and a member of the Water Storage Commission of New York. Since 1900 he has been in general practice as consulting engineer in different states, until at the present time there is hardly a phase of power development or water storage that has not at some time or other been before him for consideration. *Condensed from preface.*

Under "Maximum and minimum flow of streams," p.422, author deals with cause, frequency, prevention and prediction of floods. Considers separately floods in most of the streams of the state; discusses water-storage projects, etc.

Rafter, George W.

Water resources of the state of New York, pt.1-2. 200 p. 3 diag. 4 maps. 25 pl. 1898. [published] 1899. (In United States—Geological survey. Water-supply and irrigation papers, no.24-25.)

Index, p.199-200.

Revision published as "Hydrology of the state of New York."

Russell, Thomas.

Floods. 4,500 w. 1893. (In Johnson's universal cyclopædia, v.3, p.421.)

"References," p.423.

The same, 1902. (In same, new ed. [Universal cyclopædia and atlas], v.4, p.393.)

"References," p.395.

Coastal floods, reservoir floods, river floods, run-off, levees, mode of occurrence of high water, forests, records of river-stages, flood-wave movement, river-stage predictions, rainfall and river rise.

United States—Library of Congress.

List of works relating to deep waterways from the Great lakes to the Atlantic ocean, with some other related works. 59 p. 1908.

Includes books (with alphabetical arrangement by authors), articles in periodicals (with chronological arrangement, 1887-1908), congressional documents (with chronological arrangement, 1808-1907). The references to books and documents have full titles and in many cases tables of contents or explanatory notes.

A few of the articles and documents deal with flood abatement.

United States—Weather bureau.

Work of the Weather bureau in connection with the rivers of the United States. 106 p. 3 diag. 1896. (In United States—Weather bureau. Bulletin no.17.)

"Contents," p.11.

"Work...is to facilitate commerce...by publishing daily information as to water stages along the course of each river, and to issue timely warnings of floods so as to effect the saving of life and property." *Introduction.*

Value of the service, system of warnings, tables of distances, river tributaries, rate of flood movement, and notes on rivers and floods in various sections.

Walford, Cornelius.

Famines of the world, past and present. 103 p. 1878. (In Journal of the Statistical Society [London], v.41, p.433.)

Table 2 (p.451-468) gives a chronological list with considerable information on floods from the deluge to A. D. 1878.

Wilson, Herbert M.

Irrigation in India. Ed.2. 238 p. 93 dr. and ill. 1903. (In United States—Geological survey. Water-supply and irrigation papers, no.87.)

Index, p.227-238.

"List of works on Indian irrigation," p.25-28.

Chapter 9, p.221, deals briefly with precautions against floods: bank protection by means of earth groins and by planting of water-grass to retain silt.

Flood prediction

See also Foreign river floods (French, German)

Allard, E.

Note sur la prévision des crues. 57 p. 1 folding pl. 1889. (In Annales des ponts et chaussées, mémoires, ser. 6, v.17, p.629.)

The same, condensed translation. 300 w. (In Minutes of proceedings of the Institution of Civil Engineers, v.99, p.432.)

Daily prediction of river heights can be only approximated at present, but will doubtless be rendered more accurate by further researches. Several tables relate to flood prediction in the Seine valley.

Babinet.

Situation actuelle des études et des annonces des crues dans les principaux bassins français. 1,600 w. 1903. (In Annales des ponts et chaussées, mémoires, ser. 8, v.10, p.222.)

Work of flood prediction was established in France about 1850. Author has been connected with this work for more than five years.

Breuillé, P.

Étude sur la prévision des crues de l'Yonne, du Serein et de l'Armançon. 29 p. 1896. (In Annales des ponts et chaussées, mémoires, ser. 7, v.12, p.128.)

Byers, Charles Alma.

Our flood-warning service. 1,200 w. 1904. (In *Scientific American* supplement, v.57, p.23651.)

Review of river and flood service of United States weather bureau, in regard to its growth, its plan of action and what it is accomplishing.

Frankenfield, H. C.

Floods and flood warnings. 3,500 w. 1902. (In *United States—Department of agriculture. Yearbook, 1901*, p.477.)

Harcourt, Leveson Francis Vernon.

Prediction of floods; and protection from inundations. 24 p. 1896. (In his *Rivers and canals*, v.1, p.148.)

Holtz.

Note sur l'annonce des crues de l'Elbe en Bohème. 2,800 w. 1 map. 1 folding pl. 1891. (In *Annales des ponts et chaussées, mémoires*, ser. 7, v.1, p.477.)

Discharge of tributaries is measured and method of prediction explained.

Hyatt, R. J.

River and flood service. 400 w. 1898. (In *United States—Weather bureau. Bulletin no.24*, p.50.)

Describes work of United States weather bureau.

Mahan, Fr. & Lemoine, G.

Sur l'annonce des crues de l'Ohio. 2,500 w. 1 map. 1884. (In *Annales des ponts et chaussées, mémoires*, ser. 6, v.8, p.487.)

Plan for flood prediction somewhat similar to one in use on Seine. Based on daily communication with Cincinnati by telegraph from principal river cities and by mail from less important points.

Mazoyer.

Note sur le service de la prévision des crues dans la Loire central. 72 p. 4 diag. 2 folding pl. 1890. (In *Annales des ponts et chaussées, mémoires*, ser.6, v.20, p.441.)

Graphic representation of the three types of floods met with. Explanation of two methods of prediction. Many tables.

Outram, T. S.

Warnings of washouts, floods, cold waves, and heavy snowfalls, for the benefit of transportation companies. 900 w. 1898. (In *United States—Weather bureau. Bulletin no.24*, p.38.)

Pindell, L. M.

River and flood service. 400 w. 1898. (In *United States—Weather bureau. Bulletin no.24*, p.51.)

Voisin.

Mémoire sur l'organisation et le fonctionnement du service hydro-métrique et d'annonce des crues du bassin de la Liane. 37 p. 3 folding pl. 1888. (In *Annales des ponts et chaussées, mémoires*, ser. 6, v.15, p.464.)

The same, condensed translation. (In *Minutes of proceedings of the Institution of Civil Engineers*, v.93, p.516.)

"It is possible...in a basin of small extent, by means of careful observations of the rainfall, and the rise of the river in the upper portion of the valley, to predict with adequate correctness the rise of the river at points lower down."

Forest influence

[**Forest preservation and flood prevention.**] 700 w. 1903. (In Engineering news, v.49, p.324.)

Editorial stating that forests do not increase rainfall and that they exert no appreciable influence on flood heights.

See Lippincott for criticism.

Fox, William F.

Why our forests should be preserved and protected. 2,200 w. 1 ill. 1897. [published] 1898. (In New York (state)—Commissioners of fisheries, game and forests, v.3, p.327.)

Gives briefly the various arguments, one being flood prevention.

Johnson, Clarence T.

Effect of forests on floods in large streams. 200 w. 1903. (In Engineering news, v.49, p.369.)

Letter expressing the opinion that forests have slight effect on floods, and maintaining the impracticability of controlling the discharge of large streams by means of storage reservoirs.

Knowles, Morris, & Lehman, George M.

Report of delegates of Chamber of Commerce of Pittsburgh appearing before House committee of Congress, relative to bill for acquiring natural forests in southern Appalachian and White mountains. 1,750 w. 1908.

Briefly the bill authorizes the secretary of agriculture to acquire for national forest purposes lands valuable for their regulation of stream flow.

Report favors passage of the bill and discusses various phases of the question.

Leighton, Marshall Ora, & Horton, A. H.

Relation of the southern Appalachian mountains to inland water navigation. 38 p. 1908. (In United States—Forestry bureau. Circular no.143.)

In connection with the agricultural appropriation bill, on March 4, 1907, Congress authorized the secretary of agriculture to examine and report on the natural condition of watersheds in the southern Appalachian and the White mountains. Because of its identification with studies of stream flow and its facilities for stream measurement, arrangement was made with the United States geological survey for a study of the water resources of the southern Appalachian mountains. This report is the result.

Considers rivers which drain into the Atlantic and rivers which drain into the Ohio.

"In conclusion, the figures given in this report bear out the statement...that the proper improvement of many rivers may be practically and thoroughly accomplished only by the use of storage reservoirs and the retention of the forest cover...The second important point brought out...is that conservation of stream flow depends upon the condition of the drainage area and that to insure the perpetuation of the proper conditions it is necessary to preserve the forests and keep the land surfaces intact."

Lippincott, J. B.

Effect of forests on flood heights. 1,000 w. 2 diag. 1903. (In Engineering news, v.49, p.478.)

Discussion of a recent editorial on "Forest preservation." Presents data to show importance of forests in flood prevention.

Oswald, Felix L.

Floods and their causes. 2,000 w. 1889. (In Lippincott's monthly magazine, v.44, p.237.)

Brief description of conditions in many parts of the world. Concludes that "the affliction of river-floods in their chronic and infinitely more pernicious form is caused almost exclusively by the disappearance of arboreal vegetation, and especially by the destruction of the land-protecting highland forests."

Rafter, George W.

Natural and artificial forest reservoirs of the state of New York. 24,000 w. 6 ill. 1 map. 1897. [published] 1898. (In New York (state) —Commissioners of fisheries, game and forests, v.3, p.372.)

"Why forests conserve stream flow," p.407.

Has slight reference to flood prevention.

Roberts, Thomas Paschall.

Is the destruction of forests a cause for the increase in the frequency and height of floods? 7,000 w. 2 folding pl. 8 tables. 1884. (In Proceedings of the Engineers' Society of Western Pennsylvania, v.2, p.285.)

The same, abstract. 600 w. (In Minutes of proceedings of the Institution of Civil Engineers, v.79, p.407.)

Discussion, 3,500 w.

Contains criticism of a treatise by Gustav Ritter von Wex on "Decrease of water in springs...contemporaneously with an increase in height of floods." Author concludes that destruction of forests does not lead to increased height of floods. His views are supported by the discussion. Tables show rainfall, river stage, and flood records, both in the United States and Germany.

Rothrock, Joseph T.

Pennsylvania forests and what is necessary to their restoration. 7,000 w. 1901. (In Proceedings of the Engineers' Club of Philadelphia, v.18, p.79.)

Discussion, 3,000 w.

"Unless by some means the even flow of water in our streams is maintained, our agricultural interests will be seriously injured...Of all the helpful forces which we can control to accomplish this there is nothing so potent as a proper proportion of forest land."

T., A.

Le reboisement des montagnes. 2,000 w. 7 ill. 1903. (In Génie civil, v.43, p.337.)

Means of dealing with mountain torrents in France by artificial barrages, etc. Emphasizes importance of forest preservation and restoration, showing how this work is encouraged by the government.

Ice and its effect

See also American river floods (Susquehanna; Other rivers, Traill.)—Foreign river floods (Miscellaneous, Ritter von Wex)

Barnes, Howard T.

Ice formation, with special reference to anchor-ice and frazil. 260 p. Ill. 1906.

Considerable information on ice-floods of the St. Lawrence. See index under "Floods."

Flood damages to the Hudson river passenger bridge and station of the Delaware & Hudson Ry. at Albany, N. Y. 900 w. 4 ill. 1900. (In Engineering news, v.43, p.132.)

Bridge under construction. Falsework of draw span was partly destroyed by ice jam, in spite of protection by a system of fender piles.

Görz, M. & Buchheister, M.

Das eisbrechwesen im Deutschen reich. 248 p. 46 pl. 1900.

Describes first the formation of ice on rivers and canals, reasons for removing it, including floods and breaking of dikes, and methods used in various parts of Germany before ice-breaking steamers were introduced. The construction of such boats and their

Görz, M. & Buchheister, M.—continued.

accessories is then considered. Concludes with a description of methods and cost of breaking ice and the results obtained. Numerous maps and drawings of ice-breakers.

Henshaw, George H.

Frazil ice; on its nature and the prevention of its action in causing floods. 2,800 w. 1887. (In *Transactions of the Canadian Society of Civil Engineers*, v.1, p.1.)

Discussion, 6,400 w.

"Author's object is to...suggest a method of dealing with it, so as to prevent its more than suspected agency in producing floods." Recommends straightening of channels, clearing away of boulders and other elevations. Endorses the idea of ice-breaking vessels recommended by Government Commission on Floods.

Levees

See also American river floods (Colorado, Mississippi)

Bayley, George W. R.

Levees as a system for reclaiming lowlands. 16,000 w. 1875. (In *Transactions of the American Society of Civil Engineers*, v.5, p.115.)

Land reclamation and flood control, with special reference to the Mississippi river. "Its flood can be controlled by means of a levee system, but only the national government is able to perfect and maintain such...Levees can be relied upon, and levees alone can be. Cut-offs should be prevented wherever possible...Reservoirs are impracticable...As to the diversion of tributaries, it would be useless even if practicable."

See also Forshey, discussion, p.299.

Closing a crevasse in a Louisiana levee. 1,200 w. 1903. (In *Engineering news*, v.49, p.419.)

From New Orleans "Times-democrat."

Crevasse of Sunday, April 5, 1903, closed by the following Thursday.

See also letter, p.454.

Coppée, H. St. L.

Standard levee sections. 46 p. 106 dr. 2 ill. 1898. (In *Transactions of the American Society of Civil Engineers*, v.39, p.191.)

With discussion and correspondence.

Compares practice on lower Mississippi with foreign practice and with early work in America.

Cory, H. T.

Gravel spreader used on the Colorado river levee construction. 1,100 w. 2 dr. 4 ill. 1907. (In *Engineering news*, v.58, p.25.)

To protect newly constructed levees against erosion by high velocity of water and against burrowing by animals and insects it was decided to blanket the system with a cementing gravel. Distribution of the gravel is described.

Cost of riprap paving, brush mattresses and brush dikes for a levee protection. 1,000 w. 1907. (In *Engineering-contracting*, v.27, p.242.)

Figures on construction of West pass levee, Mississippi.

Dumas, A.

Construction des digues en terre par la méthode anglaise. 2,000 w. 3 ill. 1899. (In *Génie civil*, v.36, p.71.)

Comparison with French construction.

Forshey, Caleb G.

Delta of the Mississippi; the physics of the river, the control of its floods and the redemption of the alluvion. 33 p. 1872. (In *Proceed-*

Forshey, Caleb G.—continued.

ings of the American Association for the Advancement of Science, v.21, p.78.)

Plea for a better system of levees. Argues that the problem is national in character and cannot be solved by the states alone. Includes history of Mississippi levees.

Forshey, Caleb G.

Levees of the Mississippi river. 9,000 w. 7 ill. 1874. (In Transactions of the American Society of Civil Engineers, v.3, p.267.)

From a paper presented May 22, 1873.

History, form, dimensions and essentials.

Forshey, Caleb G.

On levees. 9,000 w. 1876. (In Transactions of the American Society of Civil Engineers, v.5, p.299.)

Discussion of paper by Bayley, dealing mainly with the Mississippi.

Maintains that levees tend to produce enlargement of channel capacity, that cut-offs have been too numerous and should be abandoned as a method of flood control.

Galliot.

Le corroyage des digues en terre. 6,500 w. 1902. (In Annales des ponts et chaussées, mémoires, ser. 8, v.3, p.196.)

Great question of levees. 700 w. 1903. (In American architect and building news, v.81, p.14.)

From New Orleans "Times-democrat."

Favors better levees on lower Mississippi. Gives statistics of crevasses.

Hardy.

Étude sur les endiguements de la Durance dans le département de Vaucluse et dans la commune de Pertuis en particulier. 8,000 w. 1 folding pl. 1875. (In Annales des ponts et chaussées, mémoires, ser. 5, v.11, p.518.)

The same, condensed translation. 800 w. (In Minutes of proceedings of the Institution of Civil Engineers, v.46, p.297.)

First combined action of landowners was in 1808. Expense of embankment to be borne by proprietors of adjacent land, aided by government grant of one-third of the cost. Work still in progress in 1875. Construction of dikes is given.

Helm, Edwin G.

Levee and drainage problem of the American bottoms. 26 p. 1 folding pl. 1905. (In Journal of the Association of Engineering Societies, v.35, p.91.)

Protection from overflow by the Mississippi in that part of the valley which lies between river and foot of bluffs in Madison and St. Clair counties, Ill.

Kerr, Frank M.

Levees, with special reference to the Red river system. 7,000 w. 1898. (In Journal of the Association of Engineering Societies, v.21, p.295.)

The same, abstract. 1,800 w. (In Engineering news, v.39, p.309.)

Account of the work then in progress and its aim.

Levee and drainage works at Memphis. 4,500 w. 7 dr. 2 ill. 1906. (In Engineering record, v.53, p.496.)

System for protection of 110 acres near business section from backwater during Mississippi floods. Describes levees, low-level sewers, and pumping station for storm water. Gives costs.

Levee construction. 700 w. 1889. (In Engineering news, v.22, p.441.)

METHODS adopted by Board of Mississippi Levee Commissioners and their chief engineer.

Levee theory on the Mississippi river; is it justified by experience? 84 p. 5 diag. 1903. (In Transactions of the American Society of Civil Engineers, v.51, p.331.)

Informal discussion by Messrs B. M. Harrod, L. W. Brown, J. A. Ockerson, L. M. Haupt, B. F. Thomas, H. B. Richardson and T. G. Dabney.

McMath, Robert E.

Levees; their relation to river physics. 4,500 w. 4 diag. 1884. (In Journal of the Association of Engineering Societies, v.3, p.43.)

With reference to the Mississippi.

"Levees can never be made safe as a protection against overflow in a river carrying large quantities of silt. The physical action of levees has also been seen to provoke silt movement, and therefore to increase the very evil they profess to guard against."

Mississippi flood and the levee system. 1,200 w. 1903. (In Engineering news, v.49, p.276.)

Editorial calling attention to unintelligent newspaper criticism of levee system. Considers flood of 1903 additional proof of the value of levees.

Mississippi levees and the flood. 2,200 w. 1897. (In Railroad gazette, v.29, p.619, 622.)

Extracts from letter of Richardson. Considers percentage of levee that failed, efficiency of levee protection, grades, proper cross-section, settling and maintenance.

Mount, Mary W.

New methods for closing a crevasse in a Mississippi river levee: the Live Oak crevasse, Louisiana. 2,100 w. 5 ill. 1907. (In Engineering news, v.58, p.431.)

Said to be first case in which track was laid on bridge work across break; also new methods of pile bracing and sheeting. Earth-filled sugar sacks were used for filling.

Ozias, C. W.

Construction of the levee below the recent Colorado river break. 1,700 w. 7 ill. 1907. (In Engineering news, v.57, p.545.)

Author is assistant engineer, United States reclamation service, lent to California Development Co. to assist in constructing the levee.

Pharr, Harry N.

St. Francis levee districts of Arkansas and Missouri. 5,000 w. 2 maps. 1902. (In Engineering news, v.47, p.24.)

Favors levee system for flood protection. Admits the advantages of reservoir systems for some Western rivers, but believes that for the Mississippi they would be impracticable, as also would channel rectification, water diversion and outlet methods.

Rundall, F. H.

[Disposal of flood waters.] 400 w. 1880. (In Minutes of proceedings of the Institution of Civil Engineers, v.80, p.130.)

In a discussion on "Weirs" author argues that embanking of rivers does not cause rise of beds.

Starling, William.

Levees of the Mississippi river. 12,300 w. 11 ill. 1 map. 1896. (In Engineering news, v.35, p.66, 77.)

Describes in detail the construction and maintenance of levees, the nature of crevasses and methods of repair.

State levees of Louisiana. 1,200 w. 1898. (In Engineering record, v.38, p.353.)

Editorial on extent and cost. There are (1898) 1,194 miles of levee in Louisiana and 90 miles in Arkansas.

Reservoirs

See also American river floods (Mississippi)

Chittenden, Hiram M.

Preliminary examination of reservoir sites in Wyoming and Colorado. 110 p. 25 ill. 1 map. 10 folding pl. 1897. (In United States—55th congress, 2d session. House document no.141.)

Index, p.105-110.

The same. (In United States—Engineer department. Report, 1898, pt.4, p.2815.)

Some consideration of floods in the United States and abroad.

Gros.

Note sur l'insuffisance des réservoirs pour atténuer le danger des inondations. 3,600 w. 1881. (In Annales des ponts et chaussées, mémoires, ser. 6, v.2, p.5.)

The same, condensed translation. 800 w. (In Engineering news, v.25, p.258.)

The same, condensed translation. 600 w. (In Minutes of proceedings of the Institution of Civil Engineers, v.66, p.408.)

Investigations in valleys of Seine, Rhone, Loire, Garonne and other important rivers led to decision against proposed reservoir systems, owing to their doubtful efficacy. Reservoirs on tributaries, by retarding of floods might be injurious. Flood reservoirs cannot safely be used for irrigation, canal supply, etc., as they should be kept empty during entire flood season. Urges abandonment of all reservoirs.

Harwood, W. S.

Great reservoir system of the upper Mississippi. 4,000 w. 1 map. 1897. (In Harper's weekly, v.41, pt.1, p.38.)

Chief benefit is said to be prevention of floods or reduction of their intensity. Others are irrigation; more uniform water distribution for power purposes and navigation; improvement in quality of domestic water-supply during low water.

Pyle, J. G.

Reservoir system. 4,000 w. 3 dr. 1 map. 1884. (In Harper's monthly magazine, v.69, p.616.)

Describes system already begun, which contemplates the erection of five dams on the upper Mississippi proper and others on its upper tributaries.

Seddon, James A.

Monograph...on reservoirs and their effects on floods of Mississippi system. 31 p. 2 pl. 1898. (In United States—Engineer department. Report, 1898, pt.4, p.2887.)

The same. (In United States—55th congress. 2d session. House document 141, p.73.)

Forms appendix C to report of Chittenden. A careful study of river discharge, flood stages, etc. for the six years 1880-85. Considers separately (1) The Mississippi and its tributaries above Cairo; (2) The lower Mississippi.

Seddon, James A.

Reservoirs and the control of the lower Mississippi. 62 p. 4 folding pl. 1900. (In Journal of the Western Society of Engineers, v.5, p.259.)

The same, abstract. 5,500 w. 1 map. (In Engineering news, v.44, p.293, 296.)

Discussion.

Proposes the construction in the St. Francis basin of the lower Mississippi (a low land tract in southeastern Missouri and northeastern Arkansas) of a system of shallow reservoirs into which flood water could be diverted, to be turned back to the river during low water. These reservoirs are planned to cover about 4,000 sq. mi. with an average depth of $15\frac{1}{2}$ ft. Estimated cost \$32,000,000.

See also Townsend.

Townsend, Maj. C. McD.

Reservoirs and the control of the lower Mississippi. 6,400 w. 6 folding pl. 1901. (In Journal of the Western Society of Engineers, v.6, p.146.)

Discussion of paper by Seddon on above subject. Agrees with many of the views expressed, but questions the economy of reservoir construction as contrasted with improved levee system. Final remarks by Seddon claim for reservoirs an advantage in cost of maintenance and in safety.

Sanitation

See also American river floods (Ohio and branches, Easton)

Groff, George G.

How sickness was prevented at Johnstown. 2,600 w. 1890. (In Chautauquan, v.10, p.563.)

Work done by State board of health, of which author is a member, aids to state work and lessons for the future.

Pennsylvania—Health board.

Operations of the Board of health in consequence of the floods at Johnstown of May 31, 1889. 134 p. 1891.

Contents: Johnstown and the valleys of the Conemaugh, Kiskiminitas, Allegheny and Ohio.—West branch of the Susquehanna.—The Susquehanna.—The Juniata. Appendix E to the fifth annual report of the State board of health.

Sanitary precautions after floods. 600 w. 1883. (In American architect and building news, v.13, p.297.)

Sanitation of houses in France. Instructions from Comité consultatif d'hygiène publique, June 12, 1856, and from Conseil d'hygiène publique, etc., de salubrité du Département de la Seine, Jan. 5, 1883.

Soper, George A.

Sanitary cleaning of Galveston after the great storm of 1900. 1,800 w. 1901. (In Engineering news, v.45, p.301.)

Extracts from report to New York Chamber of Commerce. Gives results accomplished and suggestions for continuing sanitation.

Soper, George A.

Sanitary measures to be adopted after floods. 2,600 w. 1902. (In Scientific American supplement, v.53, p.22118.)

From "American journal of the medical sciences."

Importance of precautions in regard to food and water-supply, disinfectants, refuse disposal, cleaning of premises and repairing of damages.

American river floods

See also Bibliographies and Indexes (Murphy)

Brazos

Hutson, William Ferguson.

Brazos river flood. 600 w. 6 ill. 1 map. 1899. (In Harper's weekly, v.43, pt.2, p.750.)

Texas flood of June-July 1899, "the third flood of importance in this section."

Texas floods. 200 w. 1899. (In Chautauquan, v.29, p.504.)

Estimates of damage in Brazos river flood, June-July 1899.

Texas floods. 400 w. 1899. (In Independent, v.51, pt.2A, p.1852.)

Brazos river flood, June-July 1899.

Colorado

Break of the Colorado river into the Imperial valley and Salton sink. 3,500 w. 2 dr. 1 map. 1906. (In Engineering news, v.55, p.216.)

Attempt to tap the Colorado by an irrigating ditch led to diversion of most of the river and inundation of the Salton sink or basin, which is below sea-level.

Describes also attempts at checking of flow, by Southern Pacific Company.

Byers, Charles Alma.

Possibilities of Salton sea. 2,800 w. 19 ill. 1 map. 1907. (In Popular science monthly, v.70, p.5.)

Some probable consequences of failure to restore river to old channel. Agrees however that value of the land and its products far outweighs the possible benefits of such an inland lake. Reviews the first six attempts at closure, none of which was successful.

Closing latest break of the Colorado river into the Salton sea. 800 w. 10 ill. 1 map. 1907. (In Railroad gazette, v.42, p.217.)

Crevasse caused by water undermining the levee previously constructed.

Colorado river crevasse and Salton sea; the great work of control. 2,000 w. 2 maps. 1906. (In Railway age, v.42, p.547.)

Outlines six attempted methods of control.

Controlling the Colorado river and Salton sea. 2,000 w. 6 ill. 3 maps. 1906. (In Scientific American, v.109, n. s. v.95, p.467.)

Cory, H. T.

Closing the break of the Colorado river into the Salton sink, southern California. 5,500 w. 3 maps. 1906. (In Engineering news, v.56, p.671.)

Describes briefly the six attempts, the last of which was then thought to be successful. Gives statistical summary of the work. Author is general manager and chief engineer of the California Development Co.

Cory, H. T.

Closing the new break in the Colorado river. 3,200 w. 6 ill. 2 maps. 1907. (In Engineering record, v.55, p.293.)

Cory, H. T.

Colorado river crevasse and Salton sea. 2,600 w. 1 diag. 5 ill. 5 maps. (In Railway age, v.43, p.953.)

Deals largely with effect on Southern Pacific lines and work of this railway company in controlling the river.

Davis, Arthur P.

New inland sea. 4,500 w. 8 ill. 1 map. 1907. (In National geographic magazine, v.18, p.37.)

Describes break of the Colorado river into Salton sea, and attempts to regain control of the river.

Day, Allen.

Inundation of the Salton basin by the Colorado river, and how it was caused. 1,600 w. 9 ill. 1 map. 1906. (In Scientific American, v.108, n. s. v.94, p.310.)

Grunsky, C. E.

Lower Colorado river and the Salton basin. 51 p. 18 ill. 6 maps. (In Transactions of the American Society of Civil Engineers, v.59, p.1.)

Discussion, 11 p.

History, topography and improvements of the region; the crevasse and its attempted repair.

Grunsky, C. E.

Lower Colorado river during and after the freshet stage of 1907. 1,600 w. 1 map. 1908. (In Engineering news, v.59, p.410.)

Foot-note gives a list of papers in former issues of the "Engineering news" on the Colorado river break.

James, George Wharton.

Overflow of the Colorado river and the Salton sea. 1,800 w. 2 dr. 9 ill. 1906. (In Scientific American, v.108, n. s. v.94, p.328.)

Destructive work of the flood and remedial measures.

Notes on closing the break in the Colorado river. 2,800 w. 7 ill. 1 map. 1907. (In Engineering news, v.57, p.210, 216.)

Ockerson, J. A.

Diversion of the Colorado river into the Salton sink and the efforts made to restore it to its former channel. 3,600 w. 9 ill. 2 maps. 1907. (In Journal of the Association of Engineering Societies, v.38, p.261.)

Rockwood, C. R. [&] Ellison, C. H.

Colorado river crevasse; Salton sea; Southern Pacific tracks. 5,000 w. 1 diag. 2 maps. 1906. (In Railway age, v.41, p.420.)

Causes of flood and results of efforts to check it. New line construction with increased mileage necessitated on Southern Pacific.

Schuyler, James D.

Reinforced concrete and steel headgates for the Imperial canal, Colorado river. 900 w. 3 ill. 1906. (In Engineering news, v.56, p.675.)

Massive construction having large capacity.

See on this page telegraphic correspondence of President Roosevelt and E. H. Harriman relative to closing of break. 500 w.

Story of Salton sea. 5,000 w. 3 maps. 1907. (In Builder, v.93, p.211, 237.)

Washington, W. D. H.

Colorado river closure. 3,000 w. 16 ill. 1 map. 1907. (In Scientific American, v.110, n. s. v.96, p.374.)

Causes and effects of break, and attempted methods of repair.

Conemaugh*See also Sanitation***Beale, David J.**

Through the Johnstown flood, by a survivor. 424 p. 32 ill. 1890.

Connelly, Frank, & Jenks, George C.

Official history of the Johnstown flood. 252 p. 18 ill. 1889.

Ferris, George T.

Complete history of the Johnstown and Conemaugh valley flood, embracing also a history of the floods in Williamsport, Lock Haven, Sunbury and all the flooded districts in the state of Pennsylvania, also in Washington, D. C., New York, Maryland, Virginia and West Virginia. 522 p. 48 ill. 1889.

Flagg, J. F.

Velocity of flow in the South Fork spillway. 400 w. 1889. (In Engineering news, v.22, p.41.)

Letter, with editorial comment.

Francis, James B. and others.

Report of committee on the cause of the failure of the South Fork dam. 19,500 w. 11 ill. 7 folding pl. 1890. (In Transactions of the American Society of Civil Engineers, v.24, p.431.)

With discussion.

General discussion of the discharge of streams. 5,000 w. 1 map. 1902.
(In Proceedings of the Engineers' Club of Philadelphia, v.19, p.205.)

Floods and flood protection, considering rivers in Pennsylvania only. Map shows South Fork dam and Johnstown region.

Jennings, William N.

Through the Conemaugh valley; a series of photographs showing the destructive effect of the flood of May 31, 1889, along the line of the Pennsylvania railroad; printed from original negatives. 21 pl. 1889.

Photographs of Johnstown flood, with blue print of the region showing location of the views.

Johnson, Willis Fletcher.

History of the Johnstown flood...with full accounts also of the destruction on the Susquehanna and Juniata rivers and the Bald Eagle creek. 459 p. Ill. 1889.

Johnstown disaster. 3,000 w. 1 ill. 1 map. 1889. (In Engineering news, v.21, p.517.)

Describes the region, the construction of the South Fork dam on the Conemaugh river and the results of its failure.

Johnstown disaster. 2,000 w. 1889. (In Engineering news, v.21, p.527.)
Editorial on causes and responsibility for the disaster.**Johnstown flood; effect on the engines at Conemaugh. 1,400 w. 1 diag. 1889. (In Engineering news, v.22, p.153.)**

Describes and illustrates the position in which 32 locomotives were left by the flood. Some of them were carried almost a mile.

McLaurin, J. J.

Story of Johnstown; its early settlement, rise and progress, industrial growth and appalling flood on May 31st, 1889. 380 p. 19 ill. 1890.

Pennsylvania—Governor. (J. A. Beaver.)

Message to the General assembly, Jan. 6, 1891. 8 p. 1891.

Deals with Johnstown flood and work of the State board of health.

Appendix, 11 p. 1889. Contains preliminary report of the secretary of the State board of health on the sanitary condition of the flooded regions in Cambria, Westmoreland, Indiana, Allegheny and Beaver counties.

Richards, J. W.

The flood at Johnstown. 400 w. 1889. (In Engineering news, v.22, p.40.)

Letter in which writer claims that the time in which the flood reached Johnstown was nearly an hour, instead of 20 minutes, as previously stated in "Engineering news."

Rivers at Johnstown, Pa. 1,000 w. 1891. (In Engineering news, v.25, p.614.)

Advance information from a report by J. J. R. Croes on flood dangers and preventive measures. Recommends widening and deepening of channel.

South Fork dam and Johnstown disaster. 3,200 w. 5 diag. 6 ill. 1889. (In Engineering news, v.21, p.540.)

Deals with location of dam, its structure and failure.

See also editorial, p.550.

South Forks dam. 3,200 w. 1889. (In Engineering news, v.21, p.551.)
Construction.

Work of the flood at Johnstown. 3,600 w. 7 ill. 1889. (In Engineering news, v.21, p.569.)

Mississippi

See also Bibliographies and indexes (Nelson and others).—Levees.—Reservoirs

Abbott, Frederic Vaughan.

Annual report upon construction of reservoirs at head waters of Mississippi river, improvement of Mississippi river from St. Paul to Minneapolis, of rivers in Wisconsin and Minnesota tributary to Mississippi river and of Red river of the North, gauging Mississippi river at St. Paul. 32 p. 1 map. 1 pl. 1898. (In United States—Engineer department. Report, 1898, pt.3, p.1809.)

Ballou, William Hosea.

Floods; their history and relations. 1,000 w. 1885. (In American naturalist, v.19, p.1159.)

Places cause of Mississippi floods in the Ohio valley.

"Congress will find it cheaper to purchase the land sources of the Ohio and its confluents, plant them with forests and wall them, than to plaster broken levees."

Bank protection on the Mississippi river. 1,300 w. 3 ill. 1889. (In Engineering news, v.22, p.558.)

Work at Greenville, Miss. Submerged dikes, formed from cribs of willows, wire and stone.

Bayley, G. W. R.

Overflow of the delta of the Mississippi. 7,000 w. 1852. (In De Bow's review of the Southern and Western states, v.13, n. s. v.1, p.166.)

Review of report by Charles Ellet, calling it "the best paper yet published [1852] upon the subject."

Bowman, Isaiah.

Deflection of the Mississippi. 2,200 w. 3 diag. 1904. (In *Science*, v.43, n. s. v.20, p.273.)

Study of effect of earth's rotation. Surveys and measurements in the flood-plain of the Vicksburg region.

Bridges, Lyman.

Overflow of the Mississippi river. 12,000 w. 1 ill. 1 folding map. 1882. (In *Transactions of the American Society of Civil Engineers*, v.11, p.251.)

With discussion.

Recommends relief channel or "cut-off" from Red river to Atchafalaya bay.

Brown, Linus W.

Increasing elevation of floods in the lower Mississippi river. 16 p. 1901. (In *Journal of the Association of Engineering Societies*, v.26, p.345.)

Discussion, 40 p.

The same, condensed. 4,000 w. (In *Engineering news*, v.45, p.280.)

From paper before Louisiana Engineering Society, March 11, 1901.

Author has had an acquaintance of 21 years with the Mississippi and its problems and has been for 15 years directly connected, officially and otherwise, with levee work on the lower river.

Arguments relative to increasing floods, cause and remedy, considering the river from Cairo to the Gulf. Elevation of great floods is increased not by reason of greater volume but by (1) construction of levees on lines not calculated to maintain a constant cross-section of the river; (2) changing of river-bed and moving back of levees around bends, thus increasing distance to ocean-level and decreasing slope; (3) formation of accretions on bottom and sides of channel at bends, without corresponding abrasion on concave side.

Considers levees absolutely necessary, but construction must be on more intelligent lines and aided by other equally important work, reservoirs, etc.

See also Hardee, for discussion.

Brown, Linus W.

Protection of cities in the Mississippi valley against the encroachment of the river. 3,000 w. 1901. (In *Engineering news*, v.45, p.427.)

Deals mainly with methods of shore protection.

Brown, Robert Marshall.

Protection of the alluvial basin of the Mississippi. 4,000 w. 3 diag. 2 maps. 1906. (In *Popular science monthly*, v.69, p.248.)

Compiled largely from reports of the Mississippi River Commission. Discusses necessity for protection, the levee system and its increasing efficiency.

Convention of the Interstate Mississippi River Improvement and Levee Association at New Orleans. 3,100 w. 1903. (In *Engineering news*, v.50, p.435.)

Convention Oct. 28, 1903. Resolutions reprinted from New Orleans "Picayune."

Claim that bed of Mississippi is not rising; condemn all "reservoir" and "outlet" schemes, considering the flood of 1903 a vindication of levee system. Recommend national control of Mississippi works.

Coppée, H. St. L.

Bank revetment on the Mississippi river. 18 p. 18 ill. 1896. (In *Engineering magazine*, v.11, p.486.)

Curtis, David A.

Mississippi river problem. 4,000 w. 1882. (In Harper's monthly magazine, v.65, p.608.)

Popular article on necessity of artificial protection from floods. Mentions proposed methods.

Dabney, A. L.

The high water fight. 400 w. 13 ill. 1897. (In Harper's weekly, v.41, pt. I, p.471, 472.)

Work during flood of March 1897. Methods well illustrated.

Dabney, T. G.

The recent Mississippi river floods and their relation to the levees. 2,100 w. 1903. (In Engineering news, v.50, p.27.)

From manuscript report, on high water of 1903, to Mississippi River Commission. Expresses confidence in levee system. Considers the most vulnerable feature to be the instability of the foundation in many places.

Dickson, Harris.

Fight for the levees. 1,800 w. 5 ill. 1903. (In Harper's weekly, v.47, pt. I, p.580.)

Graphic account of floods on lower Mississippi.

Dutton, Chauncey N. & Coppée, H. St. L.

More of the Mississippi problem. 5,000 w. 1892. (In Engineering magazine, v.3, p.623.)

Leading author considers levees indispensable; second author compares conditions with those on the Yellow river and the Po.

East St. Louis and the floods. 300 w. 1883. (In Engineering news, v.10, p.313.)

Advocates protection by raising the existing dike and the railroad embankments.

Ellet, Charles, jr.

Of the physical geography of the Mississippi valley, with suggestions for the improvement of the navigation of the Ohio and other rivers. 26,000 w. 1849. (In Smithsonian Institution. Contributions to knowledge, v.2, art.4. [no.13].)

From ten years' daily gage readings at Wheeling, author concludes that by use of reservoirs a six-foot stage during entire year may be secured and that floods would be restrained.

Forshey, Caleb G.

Cut-offs on the Mississippi river; their effect on the channel above and below. 2,800 w. 1876. (In Transactions of the American Society of Civil Engineers, v.5, p.317.)

Retracts his former arguments in favor of Racourci "cut-off" and opposes all "cut-offs" as injurious.

Fullerton, Aubrey.

Completing of the Mississippi. 2,000 w. 4 ill. 1906. (In World to-day, v.10, p.494.)

Describes various improvements, including reservoirs, which, it is claimed, "prevent floods, except in their own immediate vicinity, and when they cannot fully prevent they reduce them."

Government protective works on the Mississippi river, at Plum Point and at Memphis, Tenn. 800 w. 4 ill. 1889. (In Engineering news, v.22, p.386.)

Illustrates bank revetment with willow mattresses, ballasted with stone.

Greenleaf, James L.

Hydrology of the Mississippi. 18 p. 3 diag. 1 map. 1896. (In American journal of science, v.152, ser. 4, v.2, p.29.)

Graphic and tabular data on rainfall, flow and times of high and low water in Mississippi and tributaries.

Greenleaf, James L.

Times and causes of Western floods. 3,200 w. 1 map. 1897. (In Engineering magazine, v.12, p.949.)

Mississippi system. Rainfall and discharge data of principal watersheds, and chronological table of floods and low water for Mississippi tributaries are features.

Hardee, William Joseph.

Are flood heights increasing in the lower Mississippi river? 6,000 w. 1901. (In Engineering news, v.45, p.378.)

From paper before Louisiana Engineering Society, May 13, 1901, in discussion of paper by Brown. Claims that Mr Brown's statements were based on insufficient data. Argues that carrying capacity of channel has not been reduced, that levee system is a success and will eventually prove the means of increasing carrying capacity of river, and that floods will pass at lower level than formerly.

Hardee, William Joseph.

High-water protection methods on lower Mississippi river. 9,000 w. 1900. (In Journal of the Association of Engineering Societies, v.25, p.85.)

Six separate agencies are now (1900) more or less active in levee construction. Author urges concentrated and systematic action. Believes that "a system for economically and efficiently preserving the levee line during flood can be devised."

Harris, L. O.

Battle for the delta. 2,000 w. 4 ill. 1903. (In Independent, v.55, pt.2, p.1135.)

Flood in spring of 1903(?)

"Writer here presents not only an impressive and graphic study of the manner in which the population met the danger, but also outlines the trend of an already strong sentiment which is felt in three states and urgently demands consideration by the federal government." *Editorial note.*

Harrod, B. M.

Mississippi flood of 1890. 1,200 w. 3 diag. 1890. (In Engineering news, v.23, p.315.)

From New Orleans "Times-democrat." Author is a member of the Mississippi River Commission, and defends the levee-building policy of the commissioners, believing that the experience of the past eight years has been very encouraging.

Haupt, Herman.

Problem of the Mississippi. 3,800 w. 1899. (In Journal of the Franklin Institute, v.147, p.297.)

Considers reservoirs impracticable; objects to levees alone as tending to increase flood heights, and to outlets alone as diverting too much water during low stages. Favors a waste weir system, inoperative at ordinary levels, but allowing flood surplus to escape to Gulf by Atchafalaya and other streams.

Haupt, Lewis M.

Controlling the floods of the Mississippi river. 5,000 w. 3 ill. 3 maps. 1903. (In Journal of the Franklin Institute, v.156, p.241; v.157, p.387.)

Gives data from observation and experiment. Points out defects of levee system. Concludes that the problem requires: reservoirs on the tributaries, especially of the western sections; reforestation of arid regions; levees with readjusted alignment and weirs to be connected with large reservoirs in swamps; removal of bars and opening of all possible outlets at delta.

See also Meerten, for discussion.

Haupt, Lewis M.

Mississippi problem. 900 w. 1892. (In Engineering magazine, v.3, p.615.)

Discussion of paper by "Southern engineer."

Does not object to outlet plan, but favors levees also, and reservoirs on lower river.

Haupt, Lewis M.

Mississippi river problem. 25 p. 1 map. 1904. (In Proceedings of the American Philosophical Society, v.43, p.71.)

Comments on failure of the engineering profession to consider control of sediment as well as control of water. Instead of parallel jetties at river mouth "it will be found more rational to build one curved training wall so placed as to create a head and reaction which will transport the silt to the opposite or convex bank, where it will be deposited...leaving an ample navigable channel and saving the expense of one of the jetties, while it also scours away the bar...and affords an open passage for the effluent water."

Howard, D. S.

Overflow of the Mississippi river. 2,300 w. 1871-72. (In Journal of the Franklin Institute, v.92, ser. 3, v.62, p.253; v.94, ser. 3, v.64, p.334.)

Arguments in favor of reservoirs in contrast with levee system.

Johnson, J. B.

Great floods on the lower Mississippi, as illustrated in the flood of 1882. 3,200 w. 1 diag. 1 map. 1883. (In Journal of the Association of Engineering Societies, v.2, p.115.)

Sources of floods; general action of a large flood below Cairo; the flood of 1882.

Johnson, J. B.

Protection of the lower Mississippi valley from overflow. 7,000 w. 1884. (In Journal of the Association of Engineering Societies, v.3, p.169.)

The same, condensed. 5,500 w. 1890. (In Engineering news, v.23, p.364.)

Paper before Engineers' Club of St. Louis.

Discusses various systems, favoring levees high and strong enough to contain ordinary floods, with waste weirs through which the surplus waters of great floods may escape without damaging the levees.

Jones, W. A.

Annual report upon construction of reservoirs at head waters of Mississippi river, improvement of rivers in Wisconsin and Minnesota tributary to Mississippi river, and of Red river of the North, Minnesota and North Dakota; gauging Mississippi river at St. Paul. 39 p. 1897. (In United States—Engineer department. Report, 1897, pt.3, p.2137.)

Includes operation and care of reservoirs at head waters of Mississippi river, giving some figures of cost of construction and maintenance.

"The purpose of the reservoirs is to collect the surplus water...to be systematically released so as to benefit navigation upon the Mississippi...Reduction of heights of floods in localities immediately below the dams is expected to obtain to some extent, but control of extended floods or freshets is not expected."

Kellogg, D. O.

Mississippi floods. 1,500 w. 1883. (In The American [Philadelphia], v.6, p.297.)

Discussion of article by Shaler on "Floods of the Mississippi valley." Claims that breaking up and cultivation of prairie land acts as a valuable flood preventive by allowing rain to sink into ground. Thinks that with proper control of the Ohio, the flood problem of the Mississippi will be largely solved.

Leach, Smith S.

Mississippi problem. 3,000 w. 1888. (In Science, v.11, p.87.)

Discusses merits of revetment and anti-revetment theories of protection.

Lower Mississippi river. 2,000 w. 1 diag. 4 ill. 2 maps. 1899. (In United States—Geological survey. Annual report, v.20, pt.4, p.347.)

Discussion of levee system and the origin and control of floods.

Meerten, H. van.

Controlling the floods of the Mississippi. 3,500 w. 1904. (In Journal of the Franklin Institute, v.157, p.381; v.158, p.310.)

Letters discussing paper by Haupt on "Controlling the floods of the Mississippi river."

Agrees with many of the statements, but opposes plan of creating and maintaining outlets, and advocates application of principles successfully used in Holland. Commends the Eads system, which aimed at having "only one ample outlet for the great river, exactly as it is aimed by the Waterstaat for the Rhine and other great rivers." Commends also the Waterstaat idea of insisting on creation and maintenance of a distinct summer-, winter- and flood-bed. Thinks the same principles will apply to the Mississippi as to the Rhine; "the works only have to be undertaken upon a relatively larger scale."

Meerten, H. van.

The Mississippi; controlling floods, navigation improvements. 6,500 w. 3 ill. 1905. (In Journal of the Franklin Institute, v.159, p.423.)

Final contribution to discussion of paper by Haupt.

[Miller, A. M.]

The Mississippi river improvements. 600 w. 1883. (In Engineering news, v.10, p.357.)

At Memphis reach and harbor and the Ouachita river, Ark. Mississippi flood record for a year is given.

Milner, B. C. jr.

Floods along the Southern railway. 1,600 w. 4 ill. 1897. (In Railroad gazette, v.29, p.507.)

Mississippi flood. 1,600 w. 19 ill. 1897. (In Harper's weekly, v.41, pt.1, p.401.)

Flood of March 1897. Statistics of damage by this and previous floods and cost of protective measures.

Mississippi floods. 600 w. 1883. (In Engineering news, v.10, p.313.)

"The present is the eighth great flood in the Mississippi of which we have authentic account."

Gives briefly the extent of each. Accepts the theory that the Mississippi is gradually filling up, and in course of time will find another channel.

Mississippi floods. 600 w. 1897. (In Public opinion, v.22, p.392.)

Newspaper editorials.

Mississippi river flood. 4 p. 1 map. April 22, 1897. (In United States—Department of agriculture. Miscellaneous circular no.3.)

Second report relative to extension of flood in lower Mississippi valley. First report appeared April 12, 1897.

Morrill, Park.

Floods of Mississippi river. 1897. 79 p. 3 ill. 51 maps. 9 pl. (In United States—Weather bureau. Bulletin E. [publication] 143.)

The same. (In United States—Weather bureau. Report, 1896-97, p.369.)

New Orleans and Mississippi flood. 1,000 w. 1897. (In Scribner's magazine, v.21, p.788.)

Editorial on flood and its proof of the inefficiency of present levee system. Criticizes unintelligent forest policy.

Ockerson, J. A.

Atchafalaya river; some of its peculiar physical characteristics. 3,500 w. 3 ill. 3 folding pl. 1906. (In Transactions of the American Society of Civil Engineers, v.58, p.1.)

A stream "widest at its source and deepest in places of excessive width." At high water serves as an outlet for about one-fourth of the flood volume of the Mississippi.

This paper presents, in condensed form, the results of recent surveys, and brings to view features and characteristics of the stream that have heretofore received little notice. Considers levees and their effect.

Ockerson, J. A.

Improvement of the lower Mississippi river. 7,000 w. 3 ill. 1 map. 1901. (In Proceedings of the International Engineering Congress, Glasgow, sec. 2, p.68.)

The same, abstract. 2,000 w. (In Engineering news, v.46, p.186.)

Discussion.

Outlines work of Mississippi River Commission, of which author is a member. Describes revetment and contraction work and the construction and maintenance of levees.

Parr, James F.

Floods and flood protection works at East St. Louis, Ill. 2,500 w. 2 maps. 1904. (In Engineering news, v.51, p.118, 179.)

Suggests several methods of protection; one a flood relief canal from the mouth of the Missouri river to the Mississippi 20 miles below East St. Louis. Favors, however, levee protection, with flood-gates at the outlets of creeks and pumping plants to be used during high water.

See also Taylor, W. D.

[**Powell, John W.**]

Prevention of floods in the lower Mississippi. 2,500 w. 1888. (In Science, v.12, p.85.)

Probable effects of storage reservoirs.

Shaler, Nathaniel Southgate.

Floods of the Mississippi valley. 2,400 w. 1883. (In Atlantic monthly, v.51, p.653.)

Favors control by reservoirs and thinks that great relief would be afforded by "1,000 reservoirs, averaging 50 acres in surface, with a mean depth of ten feet."

See also Kellogg.

"Southern engineer."

Geology and the Mississippi problem. 2,500 w. 4 diag. 1893. (In Engineering magazine, v.4, p.536.)

"There is but one treatment for the Mississippi which will be at once scientific and sensible, and this will be found in giving it a channel as nearly straight as possible from Cairo to the Gulf."

"Southern engineer."

Impending disaster on the Mississippi. 2,700 w. 1892. (In Engineering magazine, v.3, p.387.)

Discusses danger from the levee system and advocates cutting additional channels on the lower river.

Starling, William.

Floods of the Mississippi river. 900 w. 1894. (In Engineering news, v.31, p.318.)

Abstract from paper before Engineering congress in Chicago. Gives proportionate

Starling, William—*continued.*

water-supply from the Missouri, the Ohio and the upper Mississippi valleys, and describes features of the usual Mississippi flood.

Starling, William.

Floods of the Mississippi river. 14,000 w. 4 diag. 4 ill. 3 maps. 1897. (In *Engineering news*, v.37, p.242, 259.)

By chief engineer Mississippi levee district, Greenville, Miss.

Starling, William.

Floods of the Mississippi river, including an account of their principal causes and effects and a description of the levee system and other means proposed and tried for the control of the river, with a particular account of the great flood of 1897. 57 p. 5 diag. 4 dr. 27 ill. 5 maps.

Reprint of three papers which appeared under various titles in "Engineering news," 1896-97.

Starling, William.

Improvement of the South pass of the Mississippi river. 8,200 w. 3 ill. 1 map. (In *Engineering news*, v.44, p.121.)

Considers the mouths of the river, effect of scour, attempts at dredging, and construction of jetties.

Starling, William.

Mississippi flood of 1897. 10,200 w. 8 ill. 1 map. 1897. (In *Engineering news*, v.38, p.2.)

Source of this flood was mainly the Ohio and its branches.

Considers the mouths of the river, effect of scour, attempts at dredging, and breaking and repairing of levees. Solutions discussed are storage reservoirs, shortening channel by "cut-offs," artificial outlets, and the levee system. Favors the last and criticizes the idea that confining a river by levees tends to raise the bed by deposition of silt.

Starling, William.

Mississippi problem up to date. 5,000 w. 3 diag. 1892. (In *Engineering magazine*, v.4, p.247.)

Schemes for improvement of Mississippi must recognize the fact that it is pre-eminently a silt-bearing stream. Discusses feasibility and probable effect of the various proposed methods.

Starling, William.

On flood heights in the Mississippi river, with special reference to the reach between Helena and Vicksburg. 17,000 w. 6 folding pl. 1889. (In *Transactions of the American Society of Civil Engineers*, v.20, p.195.)

Based largely upon measurements of Mississippi River Commission in 1882 and 1884-85.

Starling, William.

Projected improvement of the Southwest pass. 12,000 w. 5 ill. 2 maps. 1900. (In *Engineering news*, v.44, p.222.)

Describes present (1900) condition of the pass, giving many typical cross sections. Considers prevailing winds, shore currents, "mud lumps," wave action and other factors affecting the work. Describes the project for dredging and the proposed plans for mat-tress and jetty construction.

Stein, Albert.

Mississippi river and its levees, etc. 2,000 w. 1851. (In *De Bow's review of the Southern and Western states*, v.11, n. s. v.4, p.574.)

Criticism of committee report in favor of outlets, by S. Van Wickle, chairman, on behalf of the Senate of Louisiana, published in supplement of "New Orleans bee," April 13, 1850. Mr Stein admits efficacy of outlets for flood prevention but considers improvement of navigation the most urgent necessity, and to secure this he recommends abandonment of outlets and regulation of the passes to induce scour.

Taylor, Robert S.

How to improve the Mississippi. 10 p. 1884. (In *North American review*, v.138, p.284.)

Outlines plan of federal government for channel improvement and levee construction. Argues that artificial embankments necessary for channel improvement should be provided by national government, those for overflow protection by the communities interested.

Taylor, Robert S.

Subjugation of the Mississippi. 12 p. 1883. (In *North American review*, v.136, p.212.)

Organization and functions of the Mississippi River Commission, with discussion of the problems to be solved.

Taylor, W. D.

Relation of snow to the June rises of the Mississippi river. 900 w. 1904. (In *Engineering news*, v.51, p.179.)

Letter commenting on paper by Parr. Claims that melting snow has very little part in production of floods. Followed by editorial expressing a different opinion.

United States—Mississippi river commission.

Reports, 1881-1883. 3v. Ill. [1882]-84.

The same, 1880-date. (In United States—Engineer department. Annual report of the chief of engineers, 1881-date.)

Report of 1880 is a preliminary report. Two reports were issued in 1881, in January and November. Supplemental reports were issued in 1885-88.

Chiefly concerned with engineering operations, but considers floods of the Mississippi and some of its tributaries.

Walker, Norman.

Mississippi floods. 2,000 w. 13 ill. 1897. (In *Harper's weekly*, v.41, pt.1, p.405, 408, 422.)

Presents importance of the Mississippi problem, urging definite action. Describes present (1897) conditions.

Missouri and branches**Byers, Charles Alma.**

Kansas river flood. 1,800 w. 1904. (In *Scientific American* supplement, v.57, p.23502.)

"An examination has shown that more than ninety per cent of the damage done to farm lands was directly connected with sharp curves in the river channel." Recent flood tended to straighten course by forming new channels.

Devine, Edward T.

Two disasters and the work of relief. 1,800 w. 4 ill. 1903. (In *Charities*, v.11, p.9.)

Kansas City and Heppner.

Fox, S. Waters.

Technical methods of river improvement as developed on the lower Missouri river by the general government from 1876 to 1903. 46 p. 19 ill. 3 folding pl. 1905. (In Transactions of the American Society of Civil Engineers, v.54, pt.7, p.280.)

Discussion, 20 p. 9 ill.

Valuable paper, chiefly on methods of bank protection. Considers briefly the usual April and June floods.

Kansas City flood in retrospect. 900 w. 1903. (In Charities, v.11, p.574.)
Emergency relief work, June 1903.**Struggle of the Chicago & Alton against the encroachments of the Missouri river. 2,000 w. 4 ill. 1 map. 1907.** (In Railway age, v.43, p.112.)

From notes furnished by office of chief engineer, Chicago & Alton railroad. Dike construction is favored rather than revetment.

Waddell, J. A. L.

Kansas City flow-line bridge repairs. 5,400 w. 6 ill. 1903. (In Engineering news, v.50, p.397.)

The same, with introductory notes. 1905. (In Principal professional papers of Dr J. A. L. Waddell; ed. by Harrington, p.915.)

Gives also some details of the flood of May 31, 1903.

Waddell, [J. A. L.] & Hedrick.

Engineering aspects of the Kansas floods. 2,500 w. 3 ill. 1 map. 1903. (In Engineering record, v.48, p.300.)

Location and brief description of the 17 bridges destroyed.

[Waddell, J. A. L. & Hedrick.]

Kansas City flood of 1903. 2,300 w. 8 ill. 1 map. 1903. (In Engineering news, v.50, p.233.)

Statement of the results of the flood and the main features of engineering interest in connection therewith. The city water-main was carried on one of the bridges of which a span of 185 feet was demolished. As a result the city was for 12 days without water, street-car service, gas lights and electric lights.

Willey, Day Allen.

Protecting a railroad from flood currents. 1,200 w. 6 ill. 1902. (In Scientific American, v.101, n. s. v.87, p.361.)

Ballasted mattress revetment for protection of Chicago & Alton tracks along banks of the Missouri river. Permanent protection at low cost.

Ohio and branches

See also Flood prediction (Mahan & Lemoine)

Allegheny river. 500 w. 1899. (In United States—Geological survey. Water-supply and irrigation papers, no.36, p.158.)

Data on watershed and tributaries, flood heights, etc., by George M. Lehman and others.

Brunot, Felix R.

Improvement of the Ohio river. 23 p. 9 dr. 1874. (In Journal of the Franklin Institute, v.97, ser. 3, v.67, p.305.)

The same, separate.

Agrees with Mr W. Milnor Roberts that in any system of river improvement reser-

Brunot, Felix R.—continued.

voirs may be useful adjuncts, but thinks that in the case of the Ohio the scheme is impracticable by reason of the lack of sites, size of stream, extraordinary floods, and rapid flow of tributaries. Largely a discussion of report by United States engineers G. Weitzel and W. E. Merrill. This report describes 13 proposed methods for improving navigation.

Connor, William D.

Application of the reservoir system to the improvement of the Ohio river. 6,300 w. 1908. (In *Engineering news*, v.59, p.621.)

"References," p.624.

Criticism of reservoir project, with special reference to paper of Leighton, p.498. Considers fully the disadvantages under cost, danger, time of completion, and durability. Concludes that the reservoir system "is impracticable from even a moderately conservative point of view for flood protection. It is a physical impossibility for it to produce the constant 9-ft. channel required in the Ohio, and the figures on the income from its water power are...extravagant in the extreme."

Difficulty of preventing the Ohio floods. 1,200 w. 1884. (In *Science*, v.3, p.385.)

From letter by William E. Merrill in "Cincinnati commercial gazette."

Disapproves of reservoirs on account of expense and danger. Foresees no injury from the clearing of level land but admits the probability of disastrous effects from the deforestation and cultivation of hill and mountain sides. Tries to discourage efforts at flood prevention and advocates flood-proof construction of buildings in flood-threatened regions.

Easton, Christopher.

Flood in Pittsburgh. 1,200 w. 1907. (In *Charities and the Commons*, v.17, p.1115.)

Flood of March 1907.

Losses, and measures for relief and sanitation.

Haupt, Herman.

Consideration of the plans proposed for the improvement of the Ohio river. 54 p. 1855.

Discusses scheme of Ellet for reservoir system, recognizing its merits but considering a slackwater scheme more sure and efficient.

Horton, A. H.

Effect of the conservation of flow in the Ohio basin on floods in the lower Mississippi. 3,600 w. 1908. (In *Engineering news*, v.59, p.631.)

Points out that floods in the lower Mississippi originate chiefly in the Ohio, and concludes that "with the Ohio controlled by a reservoir system, the floods of the lower Mississippi would be reduced to such stages as would cause little or no apprehension."

Lehman, George M.

[Examination of Youghiogheny river between West Newton and... McKeesport.] 1,800 w. 1899. (In *United States—Engineer department. Report*, 1900, pt.5, p.3288.)

Survey to obtain information bearing on slackwater project. Mentions early locks and dams on the Youghiogheny and the effect of floods.

Lehman, George M.

[Survey of Allegheny river from Oil City to Tarentum, Pa.] 28 p. 2 pl. 1898. (In *United States—55th congress, 3d session. House document no.72, p.10.*)

In report of Maj. Charles F. Powell.

Lehman, George M.

[Survey of West Fork river, West Virginia.] 11 p. 1899. (In *United States—Engineer department. Report*, 1900, pt.5, p.3272.)

Leighton, Marshall Ora.

[Application of the reservoir system to the improvement of the Ohio river.] 2,800 w. 1908. (In *Engineering news*, v.59, p.624.)

Reply to criticism by Connor, p.621.

Leighton, Marshall Ora.

Relation of water conservation to flood prevention and navigation in the Ohio river. 14,000 w. 1 map. 1908. (In *Engineering news*, v.59, p.498, 511.)

Appendix to preliminary report of Inland Waterways Commission.

Valuable paper, also editorial. Proposes to provide reservoir capacity sufficient "to store the top wave of the flood, which does nearly all the damage." Gives history of reservoir regulation; reservoir possibilities on Allegheny, Monongahela, Kanawha and Tennessee; influence of reservoirs on flood heights at Pittsburgh, Cincinnati and other points; effects on navigation; cost of reservoir system and benefits which would result. Contemplates about 100 reservoirs. Cost estimates unusually low.

Lessons of the Shawneetown flood. 800 w. 1898. (In *Public opinion*, v.24, p.456.)

Editorials on disastrous flood at Shawneetown, Ill. from "Chicago times-herald," "Chicago record," "St. Louis globe-democrat," and "Pittsburgh commercial-gazette."

McElroy, Samuel.

Ohio floods. 1,200 w. 1884. (In *Engineering news*, v.11, p.163.)

Advocates reservoir construction on tributaries of the Allegheny and Monongahela and attempts to show feasibility of such a course.

Merrill, William E.

Improvement of the Ohio river. 139 p. 5 folding pl. 1879. (In United States—Engineer department. Report, 1879, pt.2, p.1299.)

"Statement of the work done on this river from July 1, 1878 to June 30, 1879. The localities are named in the order of natural succession beginning at Pittsburgh."

With reports and surveys of branches, including Muskingum and Allegheny by Thomas P. Roberts, and Kiskiminitas and Conemaugh by James Worrall.

Merrill, William E.

Ohio river floods. 1,700 w. 1884. (In *Engineering news*, v.11, p.137.)

Special reference to conditions in Cincinnati. Considers control by artificial reservoirs impracticable. Protests against the practice in large cities, of encroaching on the river's banks. Does not favor a levee, but advocates the use of lowlands for business purposes only, and the construction of all buildings with a view to possible floods.

Morris, Ellwood.

On the improvement of the Ohio river. 24 p. 3 dr. 2 folding pl. 1857. (In *Journal of the Franklin Institute*, v.63, ser. 3, v.33, p.1, 145; v.65, ser. 3, v.35, p.1.)

Claims "that by using six large artificial lakes, to be filled and emptied but once a year, a navigable depth of six feet can be permanently maintained by an outlay in reservoirs of twelve millions of dollars... That six artificial lakes of the size herein contemplated, could not fail to exert a material influence in moderating the Ohio river floods."

The third article is a review of papers by Roberts.

Ohio and Mississippi floods. 900 w. 1 ill. 1903. (In *American monthly review of reviews*, v.27, p.606.)**Powell, John W.**

Our recent floods. 11 p. 1892. (In *North American review*, v.155, p.149.)

By director of United States geological survey.

Very general treatment of flood causes and prevention. The only flood specifically mentioned is the Allegheny "oil flood" of 1865(?)

Powell, S. W.

Drowning the torrent in vegetation. 3,300 w. 1884. (In Popular science monthly, v.26, p.67.)

"The extraordinarily disastrous floods of 1883-'84, in the Ohio river, have again called public attention to the close relation which the wooded or unwooded condition of steep hill-sides, in the area drained by streams, bears to the volume of water flowing in them."

Presents desirability of a great forest reservation in the Adirondacks.

Reservoir system for control of the Ohio river. 2,800 w. 1908. (In Engineering news, v.59, p.638.)

Editorial comment on recent papers of Leighton, Connor and Horton, all printed in "Engineering news" (v.59, p.498, 621, 624, 631). Recognizes the value of reservoirs but calls attention to the necessity also of levees on the Mississippi, and to the advantages of forest preservation as a check on soil erosion and filling of reservoirs by silt.

Roberts, Thomas Paschall.

Floods and means of their prevention in our western rivers. 5,000 w. 1 map. 1907. (In Proceedings of the Engineers' Society of Western Pennsylvania, v.23, p.306, 365.)

Discussion, 20,000 w. 1 diag.

Various plans for protection of Pittsburgh. Recommends raising of streets and buildings in flood section; construction of a concrete wall from ten or twelve feet below surface of ground to flood level; pumping plants for emptying sewers at flood times. The effect of forests, and various other topics are discussed by well-known local engineers.

Roberts, Thomas Paschall.

Monongahela river; some of its characteristics and brief sketch of methods undertaken for the improvement of its navigation. 6,000 w. 2 dr. 1908. (In Proceedings of the Engineers' Society of Western Pennsylvania, v.24, p.194.)

Discussion, 2,000 w.

Considers floods.

Roberts, W. Milnor.

Practical views on the proposed improvement of the Ohio river. 78 p. 1857-58. (In Journal of the Franklin Institute, v.64, ser. 3, v.34, p.23, 73, 145, 217, 289, 354, 361; v.65, ser. 3, v.35, p.73.)

Rather brief consideration of floods, in final remarks and elsewhere. Two of the later articles are in reply to Ellet. (See reference under Mississippi.)

Shawneetown levee disaster. 800 w. 1898. (In Engineering record, v.37, p.446.)

Editorial on flood of April 3, 1898. When crevasse occurred flood was three feet below crest of levee. Two possible causes of the break are suggested: the burrowing of muskrats, and imperfect construction around a drain-pipe passing through levee.

Wines, Frederick Howard.

Flood at Shawneetown. 1,800 w. 1898. (In Charities review, v.8, p.175.)

Ohio river crevasse and its disastrous effects at Shawneetown, Ill.

Passaic

See also Bibliographies and indexes (Hollister & Leighton)

Flood damage to bridges at Paterson, N. J. 1,500 w. 8 ill. 1903. (In Engineering news, v.50, p.377.)

Passaic river flood of October 1903. Two concrete bridges wrecked.

See also p.352.

Floods in the Passaic valley. 1,000 w. 1903. (In Engineering record, v.48, p.449.)

Editorial on the frequent destructive floods in this region. Their annual repetition can be prevented only by expensive protection works, which, it is suggested, should be taken in charge by the state of New Jersey.

Report of the Passaic River Flood District Commission. 79 p. 16 ill. 17 folding pl. 1906. [published] 1907.

Favors erection of controlling works at Mountain View, involving the flooding of Pompton basin.

Includes report of engineer with cost estimates, and such suggestions for legislation as have met with the approval of the commission.

Shererd, Morris R.

Flood control and conservation of water applied to Passaic river. 2,400 w. 1906. (In Engineering record, v.54, p.605.)

The same, condensed. 1,300 w. 1907. (In Engineering magazine, v.32, p.790.)

Paper before New Jersey Sanitary Association.

Conservancy both for power and water-supply purposes. Investigation prompted by the necessity for flood control. Favors state expenditure of \$11,000,000 to accomplish flood control and conservation of 200,000,000 gallons of potable water per day, which would at present (1906) be furnished partly to New York city, but eventually marketed entirely among New Jersey cities.

Susquehanna

Hoyt, John C. & Anderson, Robert H.

Notes on the flood of March 1904 in the lower Susquehanna river. 1,000 w. 3 ill. 1904. (In Engineering news, v.51, p.393.)

Effect at various points. Comparison with other floods to determine points most frequently subject to ice gorges.

Raymond, Charles W.

Preliminary examination of the west branch of the Susquehanna river...with a view of ascertaining the best practicable method of confining the waters of said river, in times of great flood, to the general course of its channel. 4,500 w. 1890. (In United States—Engineer department. Annual report, 1891, pt.2, p.1102.)

The same, abstract. 2,000 w. (In Engineering record, v.25, p.128.)

The same, abstract. 1,800 w. (In Engineering news, v.25, p.152.)

Suggested means of prevention are forest preservation, storage reservoirs, and transverse barriers across lines of drainage to aid in checking flood volumes. Means of control are levees, increase of channel dimensions, removal of causes of temporary obstruction.

Raymond, Charles W. & Schermerhorn, L. Y.

Proposed flood protection for Williamsport, Pa. 700 w. 1895. (In Engineering news, v.34, p.309.)

Abstract of United States engineers' report. Recommends removal of present dam and substitution of movable one to be lowered during floods; rectification of river section at each of three bridges; dikes for all lower parts of city; rectification of mouth of Lycoming creek; removal of islands and boom piers within city limits; an improved sewerage system, and a pumping plant for drainage of low districts at flood times.

Waters, O. P.

Flood damage to the York Haven power plant. 700 w. 2 ill. 1904. (In Engineering record, v.49, p.361.)

Hydroelectric plant on the Susquehanna river, erected at a cost of \$1,500,000, damaged by the worst ice freshet in 110 years.

Miscellaneous**Eastern United States****Allen, Charles Julius.**

Annual report upon improvement of Potomac river and its tributaries, of James river and harbor at Milford Haven, and rivers in Virginia on western shore of Chesapeake bay, protection of Jamestown island. 58 p. 1 map. 1899. (In United States—Engineer department. Report, 1899, pt.2, p.1413.)

The same. 60 p. 5 maps. 1900. (In same, 1900, pt.2, p.1701.)

Fitzgerald, Desmond.

Yield of the Sudbury river water-shed in the freshet of Feb. 10th-13th, 1886. 3,000 w. 1 folding pl. 1891. (In Transactions of the American Society of Civil Engineers, v.25, p.253.)

This watershed is one of the sources of water-supply of the city of Boston.

Flood protection in Ithaca, N. Y. 2,000 w. 5 dr. 1 ill. 1 map. 1907. (In Engineering record, v.55, p.684.)

Describes conditions at Cayuga lake and the work of confining Six Mile run to a safe channel.

Francis, James B.

Distribution of rain-fall during the great storm of October 3 and 4, 1869. 2,000 w. 1 folding map. 7 p. of tables. (In Transactions of the American Society of Civil Engineers, v.7, p.224.)

Data on a very heavy rain in eastern United States which caused great floods. During this storm the rainfall at Canton, Conn. was 12.35 inches.

[Myers, E. W.]

Study of the Southern river floods of May and June 1901. 3,600 w. 6 ill. 1902. (In Engineering news, v.48, p.102.)

Causes and effects of floods in North Carolina and West Virginia.

Report of the New York Water Storage Commission. 1,400 w. 1903. (In Engineering news, v.49, p.115, 183.)

Abstract. Commission was appointed in April 1902 to investigate floods and their prevention. Recommends state supervision and control, entrusting the execution of the work to a permanent commission. Favors in general water storage and channel regulation.

System of protection of Corning, N. Y. from floods in the Chemung river. 2,500 w. 9 ill. 1897. (In Engineering news, v.38, p.146.)

Main feature is a low, sod-covered earth dike, eight feet wide on top with slopes of three to one on the river and two to one on the land side. Seven small streams flow into the river; most of these are led through the dike in closed conduits with flap valve at end.

West Virginia flood. 500 w. 4 ill. 1901. (In Scientific American, v.85, p.43.)

Devastation in Elkhorn valley and Pocahontas coal region, June 22-23, 1901.

Zook, M. A.

Flood repairs to the Lehigh & Susquehanna division of the Central Railroad of New Jersey. 1,000 w. 3 ill. 1904. (In Engineering news, v.51, p.97.)

Floods in Lehigh valley Dec. 15, 1901 and Feb. 28, 1902, damaged road-bed in many places and wrecked a number of bridges, notably at East Allentown and Easton, Pa.

Western United States

Burton, J. R.

Flood prevention and irrigation; twin ideas. 11 p. 1903. (In North American review, v.177, p.522.)

By United States senator from Kansas (1901-07), considering particularly that section.

Can floods be prevented? 400 w. 1903. (In Independent, v.55, pt.2, p.1474.)

Editorial on conditions in western United States, favoring dams in ravines, forest protection, and especially the immediate establishment of a permanent reservoir system under government control.

Clapp, W. B. and others.

Flood of March 1907, in the Sacramento and San Joaquin river basins, California. 50 p. 1 diag. 2 maps. 1908. (In Transactions of the American Society of Civil Engineers, v.34, p.99.)

Discussion, 31 p., p.367, 460.

The flood problem of the Sacramento valley is a serious one. The authors, and many of those taking part in the discussion favor storage reservoirs.

Damage by the March floods on the P. C. C. & St. L. 1,100 w. 4 ill. 1897. (In Railroad gazette, v.29, p.336.)

Serious damage to track and to many bridges by sudden rise of Miami and other rivers.

Flood at Guthrie, Oklahoma. 1,100 w. 1897. (In Harper's weekly, v.41, pt.1, p.499, 500.)

Sudden and destructive flood on Cottonwood river.

[Galveston flood.] 600 w. 1900. (In Engineering news, v.44, p.196.)

Considers rebuilding of city and suggests grade raising.

Going, Charles B.

Causes of floods in Western rivers. 1,800 w. 11 ill. 1895. (In Engineering magazine, v.8, p.1038.)

Compares rivers of Atlantic seaboard with those west of Appalachian mountains.

Going, Charles B.

Effects of floods in Western rivers. 4,000 w. 1892. (In Engineering magazine, v.3, p.795.)

Contrast with rivers of eastern United States.

Harger, Charles Moreau.

Recent floods of the middle West. 1,200 w. 8 ill. 1903. (In American monthly review of reviews, v.28, p.74.)

Johnston, Thomas T.

The great waterway to connect Lake Michigan with the Mississippi river and its influence on floods in the Illinois river. 3,500 w. 10 diag. 1887. (In Journal of the Association of Engineering Societies, v.6, p.182.)

Discussion by James A. Seddon, 1,200 w.

Kenyon, W. J.

Story of the Sacramento flood. 2,000 w. 3 ill. 1907. (In World to-day, v.12, p.632.)

Flood in spring of 1907 in double valley of Sacramento and San Joaquin rivers. Popular account, mainly of rescues. Gives proposed schemes to prevent future floods.

Land reclamation along the Illinois river. 1,500 w. 1 ill. 1 map. 1905. (In Engineering record, v.52, p.150.)

Methods for flood protection of about 80,000 acres of land several feet below high-water level. Levees, built by boom and bucket dredge, have withstood several floods.

[Noble, Alfred, and others.]

Plans for the protection of Galveston from floods. 2,200 w. 1 dr. 1 map. 1902. (In Engineering news, v.47, p.344.)

Abstract of committee report. Recommends a concrete sea-wall more than three miles long. It is also proposed to raise level of city eight to twelve feet.

Report of the commission of engineers on the rectification of the Sacramento and San Joaquin rivers. 7,500 w. 1 map. 1905. (In Engineering news, v.53, p.250.)

Expert report to the River Improvement and Drainage Association of California. Includes discussion of rejected propositions and outlines plan proposed by present commission. Gives estimates. About 1,700 square miles will be protected from floods.

Robinson, A. F.

Floods on the Santa Fe system. 600 w. 7 ill. 1904. (In Railway age, v.38, p.850.)

Some remarkable results. Illustrates a masonry abutment weighing more than 600 tons which was carried 150 feet down stream without upsetting or cracking the masonry.

Whistler, John T.

The Heppner disaster. 1,800 w. 1903. (In Engineering news, v.50, p.53.)

From report to United States geological survey.

Sudden flood of June 14, 1903, at Heppner, Oregon, on Willow creek. In author's opinion "the great destructiveness of these so-called 'cloud-bursts' is due more to the rugged character of the topography, and the almost utter absence of vegetation, than to the unusual rainfall."

Other rivers

Breithaupt, W. H.

Grand river, Ontario peninsula; effect of deforestation and swamp drainage. 2,000 w. 1 diag. 2 ill. 1 map. 1905. (In Transactions of the Canadian Society of Civil Engineers, v.19, p.302.)

Discussion, 400 w.

"It is clear that precipitation in the peninsula is not materially affected by deforestation... The run-off is, however, very directly affected... The flow regulation of the river by means of large storage basins is for the present hardly practicable from an economical view point, and will not here be further considered."

Favors reforestation and leaving of swamps and marshes undrained.

Crowell, J. Foster.

Characteristics of the Ravine du Sud in the island of Hayti, and plan for averting its overflow. 10,800 w. 1 ill. 3 folding pl. 1891. (In Transactions of the American Society of Civil Engineers, v.24, p.470.)

Discussion, 2,500 w. 1 diag. (In same, v.25, p.343.)

"The word ravine is here to be taken in its French significance, implying a raging torrent, and not merely as a term of topographical configuration." Recommends an artificial channel to lead flood waters to sea.

Garriott, E. B.

Storms, floods and cold waves of the year [1897]. 2,800 w. 1898. (In United States—Weather bureau. Report, 1898, p.27.)

Garriott, E. B.—continued.

The same. (In United States—Department of agriculture. Annual report, 1898, p.208.)

Gives brief information on the most important floods of the year in the United States.

O'Hara, Thomas.

Flood on Bluefields river banana lands. 500 w. 1896. (In United States consular reports. Sept. 1896, v.52, no.192, p.207.)

Letter from British vice-consul at Bluefields, Nicaragua, to British consul at San Juan del Norte, sent by O'Hara.

Sluice box and flood gate construction; Fraser valley reclamation, British Columbia. 1,100 w. 1 ill. 1897. (In Engineering news, v.38, p.55.)

Replacing others destroyed by floods.

Traill, W. E.

Nature on the rampage. 1,000 w. 1907. (In Canadian magazine, v.29, p.294.)

Describes writer's impressions during ice flood at Hudson Bay Company's post on Peace river, Canada, 1888.

Foreign river floods**British****Bateman, John Frederic.**

[Flood water of rivers.] 900 w. 1863. (In Minutes of proceedings of the Institution of Civil Engineers, v.22, p.362.)

Data on several English rivers.

Bazalgette, Edward.

Victoria, Albert and Chelsea embankments of the river Thames. 11,500 w. 2 folding pl. 1878. (In Minutes of proceedings of the Institution of Civil Engineers, v.54, p.1.)

Discussion, 13,000 w.

History and description of Thames improvement works, not limited to those indicated in title. Holds that increased flood and tide heights and consequent overflows are not due to embankments. This view is supported by discussion.

Broome, Jeremy.

Floods. 1,800 w. 18 ill. 1897. (In Strand magazine, v.13, p.441.)

Popular description of a number of floods, mostly in England and West Indies.

Flood and its lessons. 2,500 w. 1859. (In Chambers's journal, v.32, n. s. v.12, p.81.)

Experiences and flood conditions in England. Urges river and stream improvement and more attention to general drainage.

Floods. 2,400 w. 1884. (In Nineteenth century, v.15, p.94.)

Deals with conditions in England and duties of conservancy boards. Considers it "desirable to restrict floods within such limits as are possible without immoderate or disproportionate outlay."

Floods on English rivers. 1,500 w. 1903. (In Spectator, v.91, p.383.)

"Present year (1903) has seen more floods than any recorded period of the same length." Deals with their causes and phenomena.

Forbes, Urquhart A.

Prevention of floods. 3,000 w. 1881. (In Macmillan's magazine, v.43, p.321.)

Considers English rivers. Mentions several schemes for organization and supervision of work, favoring that proposed by Mr Magniac—to establish small boards for local work, larger boards representing the county, and a General Conservancy Board to have charge of the whole. Does not deal with methods.

Gloyne, R. M.

Construction of the most recent flood prevention works in Eastbourne. 2,500 w. 1897. (In *Builder*, v.72, p.532.)

Author is the borough engineer. Describes works being constructed under his supervision to prevent the flooding of parts of the city. Mainly the abandonment of old sewerage systems and construction of a modern high-level system of greater capacity.

Greaves, Charles.

On evaporation and on percolation. 13,000 w. 3 ill. 1876. (In Minutes of proceedings of the Institution of Civil Engineers, v.45, p.19.)

Appendix, 20 p. Tables of rainfall, percolation and evaporation.

Discussion, 30,000 w. p.48. Considers also paper by Symons.

Includes causes of floods and storage of flood water, with reference to conditions in England.

Jacob, Arthur.

Conservancy of rivers; the valley of the Irwell. 16 p. 1 folding pl. 1881. (In Minutes of proceedings of the Institution of Civil Engineers, v.67, p.233.)

Discussion and correspondence, 82 p. 3 ill. p.249. Considers also paper by Wheeler.

Defines river conservancy in its broadest sense but deals with only one phase—flood abatement.

Lauder, Sir Thomas Dick.

Account of the great floods of August 1829 in the province of Moray and adjoining districts. 25 p. 1830. (In *Westminster review*, v.13, p.350.)

Review of book with above title, published by Adam Black, Edinburgh, 1830. 418 p.

Management of rivers. 1,100 w. 1880. (In *Engineer*, London, v.50, p.445.)

Editorial plea for more efficient regulation of English rivers. Partial reference to flood prevention.

Prevention of floods. 1,500 w. 1880. (In *Engineer*, London, v.50, p.388.)

The same. (In *Van Nostrand's engineering magazine*, v.24, p.131.)

Editorial outline of plans for organization and administration of the work in England.

Symons, George James.

On the floods in England and Wales during 1875, and on water economy. 8,000 w. 1 ill. 6 rainfall maps. (In Minutes of proceedings of the Institution of Civil Engineers, v.45, p.1.)

Appendix, 4 p. Rainfall tables.

Discussion, 30,000 w. p.48. Considers also paper by Greaves.

"The number as well as the volume of the floods of 1875 having been extremely unusual, the author has been led to believe that a brief record of their causes and effects, together with some remarks on other great floods of the past and present centuries, might be acceptable."

Wheeler, William Henry.

Conservancy of rivers; the eastern Midland district of England. 32 p. 1 folding pl. 1881. (In Minutes of proceedings of the Institution of Civil Engineers, v.67, p.201.)

Discussion and correspondence, 82 p. 3 ill. p.249. Considers also paper by Jacob.

Rivers here dealt with are typical of the drainage systems of flat districts of permeable strata, discharging into sandy estuaries; with small rainfall and no mountain torrents. Points out the advantage of a comprehensive general scheme of flood control over local attempts.

Cause of floods, p.217, 250.

French*See also* Flood prediction**Belgrand, E.**

Note sur le groupe de pluies du 21 au 24 juin 1875; crue de la Garonne; désastres de Toulouse. 4,500 w. 1876. (In Comptes rendus des séances de l'Académie des sciences, v.81, p.1017, 1082, 1168.)

The same, condensed translation. 300 w. (In Minutes of proceedings of the Institution of Civil Engineers, v.44, p.261.)

Floods of the Garonne and other rivers in France.

Belgrand, E.

Note sur les crues de la Seine et de ses affluents. 5,000 w. 1872. (In Comptes rendus des séances de l'Académie des sciences, v.75, p.1584, 1675.)

Extract from his book, "La Seine; études hydrologiques."

Belgrand, E.

La Seine; études hydrologiques. 1,500 w. 1873. (In Comptes rendus des séances de l'Académie des sciences, v.76, p.1172.)

Review of his book with above title, which deals in part with floods.

Belgrand, E.

Sur la crue de la Seine de février-mars 1876. 1,000 w. 1876. (In Comptes rendus des séances de l'Académie des sciences, v.82, p.596.)

The same, condensed translation. 200 w. (In Minutes of proceedings of the Institution of Civil Engineers, v.44, p.262.)

Causes, and comparison with floods of other French rivers.

Belgrand, E.

Sur la crue de la Seine et sur les moyens de préserver Paris des débordements du fleuve. 2,000. 1876. (In Comptes rendus des séances de l'Académie des sciences, v.82, p.1086.)

The same, condensed translation. 500 w. (In Minutes of proceedings of the Institution of Civil Engineers, v.46, p.299.)

Points out advisability of raising quays and of cutting off, in flood time, all connection between river and present sewers, removing sewage either by pumping or by discharging further down the river.

Belgrand, E.

Sur la crue de la Seine, le 23 janvier 1873. 300 w. 1873. (In Comptes rendus des séances de l'Académie des sciences, v.76, p.189.)

Measurements and observations.

Belgrand, E.

Sur le débit de la Seine et sur la crue du 17 mars 1876. 300 w. 1876. (In Comptes rendus des séances de l'Académie des sciences, v.82, p.659.)

The same, translated. (In Minutes of proceedings of the Institution of Civil Engineers, v.45, p.308.)

Comparison with other Seine floods. Possibility of accurate flood prediction.

Belgrand, E. & Lemoine, G.

Étude de la grande crue de la Seine en mars 1876. 12,000 w. 1877. (In Annales des ponts et chaussées, mémoires, ser. 5, v.13, p.435.)

Belgrand, E. & Lemoine, G.—continued.

The same, condensed translation. 400 w. (In Minutes of proceedings of the Institution of Civil Engineers, v.50, p.221.)

Greatest since 1807. Below Paris slight damage was done. This is attributed to absence of embankments and to the ample warnings given by the Hydrological department.

Harcourt, Leveson Francis Vernon-

River Seine. 48 p. 4 folding pl. 1886. (In Minutes of proceedings of the Institution of Civil Engineers, v.84, p.210.)

Discussion and correspondence, 102 p. 9 ill.

Includes rainfall, floods of the Seine and prediction of floods.

Jollois.

Mémoire sur les crues de la Loire supérieure. 25 p. 1880. (In Annales des ponts et chaussées, mémoires, ser. 6, v.1, p.273.)

Tables, 22 p.

Describes upper Loire and its branches, rainfall and flood calculation. Divides floods of this region into four types, describing each.

M., P. W. S.

Floods in France. 4,500 w. 1876. (In Leisure hour, v.25, p.68.)

Value of flood prediction; causes and prevention of floods.

German

See also Ice and its effects

Jasmund, R.

Die arbeiten der Rheinstrombauverwaltung, 1851–1900; denkschrift anlässlich des 50 jährigen bestehens der Rheinstrombauverwaltung und bericht über die verwendung der seit 1880 zur regulirung des Rheinstroms bewilligten ausserordentlichen geldmittel; nach amtlichen materialien bearbeitet. 242 p. 234 ill. [1901.]

Detailed description of the Rhine regulation work as carried out in 1851–1900. Contains numerous maps, plans, photographs, etc. showing the condition of the river at various times and places, methods and machinery used. Costs of various portions of the work are given.

Maillet, Edmond.

Etude hydrologique du Rhin allemand et du Main, les crues et leur prévision. 22 p. 1 map. 1903. (In Annales des ponts et chaussées, mémoires, ser. 8, v.10, p.200.)

Abstract of a 430 p. folio report which investigates in detail the flood conditions in these two river valleys.

Roloff, P.

Statistische nachweisungen über ausgeführte wasserbauten des preussischen staates. 136 p. Ill. 1907.

"Umgearbeiteter und erweiterter abdruck aus der Zeitschrift für bauwesen, jahrgang 1900, 1901 und 1904."

Tabulated statistics showing the cost of much of the construction work carried out since 1890. Includes river regulation, harbors, dikes, retaining walls, locks, weirs, highway bridges, aqueducts, siphon aqueducts, inverted siphons, safety gates, etc. Total cost and detailed cost of the main portions of each work are given, with brief descriptions and sketches showing their exact character.

Sympner, Arthur Leo.

Die neuen wasserwirtschaftlichen gesetze in Preussen; im auftrage des preussischen herrn ministers der öffentlichen arbeiten für den X.

Sympfer, Arthur Leo—continued.

Internationalen Schiffahrt-Kongress in Mailand zusammengestellt.
108 p. 1905.

Gives the text of five Prussian laws passed in 1904 and 1905, relating to the improvement of internal waterways and the prevention of floods, with brief explanations of the conditions which have existed and which these laws are intended to modify.

Italian

Adams, Frank D.

Embankments of the river Po. 1,500 w. 1896. (In Science, v.26, n. s. v.3, p.759.)

Criticizes Lyell's statement that river-bed has risen till it is higher than plains on either side. Danger from Po floods is minimized by irrigating ditches and by system of secondary embankments.

Asta, D.

On the prevention of floods in rivers. 1,500 w. 1883. (In Minutes of proceedings of the Institution of Civil Engineers, v.76, p.395.)

Abstract from "Il Politecnico," 1883, p.470.

Discusses various methods. Considers it inadvisable to abandon the existing systems of embankments on Italian rivers and deems the maintenance and improvement of these embankments the best solution.

Barilari.

Survey of the course of the Po. 1,600 w. 1877. (In Minutes of proceedings of the Institution of Civil Engineers, v.49, p.330.)

Abstract from "Giornale del genio civile," v.14, p.611.

Work of commission appointed following the great floods of 1872.

Artificial banks were considered inapplicable and the object sought was reduction of flood volumes, or at least an arrest of their increase. Involves investigation of: forest conditions; construction of storage basins; diversion of tributaries; channel rectification and improvement of mouths of river.

Gallizia, P.

Floods of the river Po in the nineteenth century. 1,000 w. 1878. (In Minutes of proceedings of the Institution of Civil Engineers, v.54, p.300.)

Abstract from "Giornale del genio civile," v.16, p.3, 41, 125.

Original gives very full data on floods and flood measurements. Relief is anticipated through passage of a forest law and through scour to be secured by the construction of discharge channels as far as possible into the Adriatic.

Pareto, R.

On the works proper to prevent the inundations of the Tiber in the city of Rome. 2,000 w. 1877. (In Minutes of proceedings of the Institution of Civil Engineers, v.49, p.334.)

Abstract from "Giornale del genio civile," v.14, p.84, 97, 175, 209, 258.

Favorable and unfavorable features of the following plans: reforestation of river banks; storage reservoirs; total deviation of Tiber; partial deviation of Tiber; limitation of the flow of river admitted to city; rectification of channel; additions to banks.

Report of the Commission for preventing inundation from the Tiber in the city of Rome. 300 w. 1877. (In Minutes of proceedings of the Institution of Civil Engineers, v.49, p.333.)

Abstract from "Giornale del genio civile," v.14, p.379, 419.

Details of 19 submitted plans. Recommends channel regulation above and within the city.

Shelford, William.

On rivers flowing into tideless seas, illustrated by the river Tiber. 9,000 w. 4 diag. 1885. (In Minutes of proceedings of the Institution of Civil Engineers, v.82, p.2.)

Discussion and correspondence, 50 p. 4 ill.

Has a section on protection of Rome from inundation.

Vescovali, Angelo.

Hydrometric observations on the river Tiber. 1,200 w. 1875. (In Minutes of proceedings of the Institution of Civil Engineers, v.43, p.356.)

Abstract from "Giornale del genio civile," June, July, August 1875, 80 p. 6 pl.

Comparison of various floods. Shows how deepening and straightening of channel will lead to great reduction of flood-level.

Miscellaneous**Boyle, Richard Vicars.**

On the flood of September 16th, 1878 in the Rokugo river. 300 w. 1881. (In Minutes of proceedings of the Institution of Civil Engineers, v.68, p.228.)

Appendix to paper on Rokugo river bridge (Tokio-Yokohama railway) which withstood this flood.

Davis, W. M.

Gohna landslip. 300 w. 1897. (In Science, v.28, n. s. v.5, p.437.)

In 1893 an immense landslide in the Himalayas dammed a narrow valley and caused formation of a lake. During rainy season of following year this natural dam failed. In anticipation of the flood, bridges were dismantled and telegraphic service established with lower valley. Loss was therefore very light.

De la Brosse, R.

Note sur le régime de la Theiss et les digues de Szegedin. 37 p. 10 ill. 1890. (In Annales des ponts et chaussées, mémoires, ser. 6, v.20, p.512.)

Describes plains of Hungary and construction of protective works for the town of Szegedin.

Gohna landslip and flood. 4,000 w. 1896. (In Engineer, London, v.81, p.413.)

Gonda, B.

On the means for protecting the county of Torontál (Hungary) from the inundations by the rivers Theiss and Maros. 300 w. 1876. (In Minutes of proceedings of the Institution of Civil Engineers, v.46, p.296.)

Abstract from "Journal of the Hungarian Society of Engineers and Architects," v.6, p.276.

Embankments have several times been partly or wholly destroyed. Besides strengthening these, the Theiss is to be connected to several canal systems and some channel improvements made.

Gordon, Robert.

Hydraulic work in the Irawadi delta. 31 p. 3 diag. 1893. (In Minutes of proceedings of the Institution of Civil Engineers, v.113, p.276.)

Appendices, 6 p. Tables of discharge, flood heights, etc.

Extensive embankments and their effect on floods.

Howden, Andrew Cassels.

Floods in the Nerbudda valley, with remarks on monsoon floods in India generally. 5,000 w. 1 folding pl. 1868. (In Minutes of proceedings of the Institution of Civil Engineers, v.27, p.218.)

(V) Discussion, 23,000 w. p.229. Considers also paper by O'Connell. (See reference under General.)

Effect of various natural "flood-regulators"—lakes, swamps, glaciers, p.230, 243; cracks and fissures in dry earth, p.247; forests, p.255.

Kohut, Moriz.

Die Oppa-regulierung in Jägerndorf. 1,600 w. 1 dr. 1 map. 1901. (In Zeitschrift des Österreichischen Ingenieur- und Architekten-Vereins, v.53, pt.2, p.640.)

Dike protection for a Bohemian town.

List, G. H.

Flood damages, N. W. R., India. 1,800 w. 5 ill. 1906. (In Engineer, London, v.101, p.336.)

Flood in July 1892 caused by a rainfall of 11 inches in six days. Bridges, track and retaining walls on the North-Western railway were washed out.

Morrison, G. James.

On the breach in the embankment of the Yellow river. 5,700 w. 3 ill. 2 maps. 1893. (In Engineering, v.55, p.263, 295.)

Flood of 1887. Methods of repairing a large break.

Nile floods and monsoon rains. 1,300 w. 1900. (In Nature, v.62, p.391.)

(?) Attempts to trace a connection between the extent of the Nile floods and the abundance or deficiency of the monsoon rainfall in India. Makes a plea for further scientific research in the hope of finding some means of dealing with this problem.

Prout, H. G.

Modern miracle. 800 w. 3 diag. 1897. (In McClure's magazine, v.10, p.45.)

Describes landslide and flood at Gohna, India, on a branch of the Ganges, 1893-94.

Ritter von Wex, Gustav.

Über die Donau-regulirung bei Wien. 9,000 w. 1876. (In Zeitschrift des Österreichischen Ingenieur- und Architekten-Vereins, v.28, p.77.)

The same, condensed translation. (In Minutes of proceedings of the Institution of Civil Engineers, v.46, p.294.)

Effect of floods caused principally by ice jams.

Some mountain torrents of Switzerland. 2,800 w. 25 diag. and ill. 1900. (In Engineer, London, v.88, p.106, 118, 159, 168, 188, 189, 192.)

Problems of regulation and control. These streams are dangerous by reason of the suddenness of their floods.

Starling, William.

Regulation of the Yellow river. 4,000 w. 2 dr. 17 ill. 1900. (In Engineering magazine, v.20, p.373.)

Concludes that regulation is entirely feasible, though the work thus far has not been intelligently done. "Sometimes the dikes are superfluously high and strong, sometimes they are altogether insufficient. They are always neglected. The river is suffered to get dangerously close to them, by bank erosion. The slopes are not protected by grass...and they are cut up by travel."

Walzel, A.

Ueber die in vorjahren von der Oesterr. Nordwestbahn getroffenen massnahmen gegen eine ueberfluthung des bahndamms zwischen Bisamberg und Stockerau. 4,500 w. 4 ill. 1 map. (In Zeitschrift des Österreichischen Ingenieur- und Architekten-Vereines, v.52, p.173.)

Describes effective precautions taken.

Williams, Cyrus John Richard.

Floods in the Brisbane river [Australia], and a system of predicting their heights and times. 2,800 w. 2 diag. 1 map. 1899. (In Minutes of proceedings of the Institution of Civil Engineers, v.136, p.268.)

The same, condensed. 1,800 w. (In Engineering record, v.40, p.365.)

Appendix, 4 p.

In wet weather the observers send telegraphic reports daily, and with increased frequency until hourly reports are sent during dangerously high water. From these readings hydrographs are plotted and heights predicted for any point in advance of the maximum stage. Appendix compares observed heights of various floods with results computed by author's system.

General**Belpaire, Théodore.**

On the advance of floods and on the influence of works of river improvement. 1,200 w. 1881. (In Minutes of proceedings of the Institution of Civil Engineers, v.66, p.405.)

Considers effect of rectification on hypothetical river of small size. Concludes that works of improvement accelerate propagation of the floods as long as discharge is less than that which causes overflow of improved channel.

Floods. 450 w. 1906. (In Nelson's encyclopædia, v.5, p.76.)

Floods through the failure of natural barriers. 1,500 w. 1889. (In Engineering news, v.22, p.81.)

Calls attention to dangers of this sort and gives two instances of Vermont lakes which broke through their banks and caused sudden floods of considerable proportions.

Francis, James B.

On the effect of a rapidly increasing supply of water to a stream on the flow below the point of supply. 3,000 w. 1889. (In Transactions of the American Society of Civil Engineers, v.21, p.558.)

Godbey, A. H.

Great disasters and horrors in the world's history. 612 p. Ill. 1890.

Includes Johnstown flood, floods in southern United States, in Holland, China and Japan. Description only.

Hutton, William R.

On the determination of the flood discharge of rivers and of the backwater caused by contractions. 30 p. 5 pl. 1881. (In Transactions of the American Society of Civil Engineers, v.11, p.211.)

Discussion.

As proof of the variation in expert evidence on this subject author goes at length into the "Elmira crossing case," where the N. Y. L. & W. R. R. sought to cross the N. Y. L. E. & W. at Chemung, necessitating high embankments across the Chemung valley.

Lyell, Sir Charles.

[Floods.] 3,200 w. 1892. (In his Principles of geology, ed. 11, rev., v.1, p.344.)

Brief description of floods in Scotland, Italy and United States.

Newell, F. H.

Hydrography of the arid regions. 159 p. 106 diag. 4 ill. 3 maps. 1892. (In United States—Geological survey. Annual report, v.12, pt.2, p.213.)

Arid regions of the United States. Includes (p.227) relative amount of flood waters; time of floods; intensity of floods; rainfall and river flow.

O'Connell, Peter Pierce Lyons.

On the relation of the fresh-water floods of rivers to the areas and physical features of their basins, and on a method of classifying rivers and streams with reference to the magnitude of their floods. 5,000 w. 2 folding pl. 1868. (In Minutes of proceedings of the Institution of Civil Engineers, v.27, p.204.)

Appendix, 3 p. Table of physical features of certain rivers.

Discussion, 23,000 w. p.229. Considers also paper by Howden. (See Howden, under Foreign river floods, Miscellaneous.)

Pollak, Ignaz.

Ueber flussregulirungen. 6,800 w. 6 diag. 1900. (In Zeitschrift des Österreichischen Ingenieur- und Architekten-Vereines, v.52, p.477.)

Channel rectification alone is inadequate for prevention of floods.

Preliminary report of the Inland Waterways Commission. 4,800 w. 1908. (In Engineering news, v.59, p.247.)

Condensed form of president's message and report of commission.

Prevention of floods. 1,500 w. 1880. (In Engineer, London, v.50, p.351.)

Editorial. Presents urgency of river improvement for the mitigation of floods.

River engineering. 13,000 w. 22 dr. 1886. (In Encyclopædia Britannica, v.20, p.571.)

Includes floods, their classification, causes, extent of prevention and the various methods.

Salisbury, Rollin D.

Work of running water. 60 p. Ill. 1907. (In his Physiography, p.114.)

A few illustrations of floods.

Vauthier, L. L.

De l'influence des travaux de régularisation sur le régime des rivières, notamment en ce qui touche les inondations. 53 p. 1901. (In Annales des ponts et chaussées, mémoires, ser. 8, v.1, 2 trimestre, p.108.)

Paper at Eighth International Congress of Navigation.

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Catalogue of Books, Annotated and Arranged, and Provided by the Carnegie Library of Pittsburgh for the Use of the First Eight Grades in the Pittsburgh Schools. 1907. 331 pp. 35 cents; postpaid, 50 cents.

This is an enlargement and thorough revision of the lists prepared for the first eight school grades, originally published in the "Graded and Annotated Catalogue of Books in the Carnegie Library of Pittsburgh for the Use of the City Schools," which was issued in 1900 and has been out of print since 1902. The other lists contained in that catalogue are undergoing revision.

Floods and Flood Protection; References to Books and Magazine Articles. 1908. 48 pp. 10 cents; postpaid, 15 cents.

Reprinted from the *Monthly Bulletin*, July 1908.

Gift of the German Emperor [list of books, maps and photographs]. 1908. 17 pp.

Reprinted from the *Monthly Bulletin*, April 1908.

Sodium Nitrate Industry of Chile; References to Books and Magazine Articles. 1908. 12 pp. 5 cents, postpaid.

Reprinted from the *Monthly Bulletin*, March 1908.

-Enlarged from the brief list which appeared under the same title in the *Monthly Bulletin* of November 1903.

Famous Royal Women; a Reading List for Girls. 11 pp. 5 cents, postpaid.

Reprinted from the *Monthly Bulletin*, January 1908.

Short Plays and Monologues; a List for Amateurs. 6 pp. 5 cents, postpaid.

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Electric Driving in Rolling-mills and Foundries; References to Books and Magazine Articles. 16 pp. 5 cents, postpaid.

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Metal Corrosion and Protection; References to Books and Magazine Articles. 21 pp. 2 cents, postpaid.

Reprinted from the *Monthly Bulletin*, December 1906.

Smoke Prevention; References to Books and Magazine Articles. 24 pp. 2 cents, postpaid.

Reprinted from the *Monthly Bulletin*, May 1907.

Story Hour Courses for Children from Greek Myths, The Iliad and The Odyssey; as Conducted by the Children's Department, 1906-1907. 1906. 32 pp. 5 cents, postpaid.

Index to Proceedings of the Engineers' Society of Western Pennsylvania, Volumes 1 to 20, 1880-1904. Compiled by Harrison W. Craver. 1906. 144 pp. \$1.00, postpaid.

List of Good Stories to Tell to Children under Twelve Years of Age; with a Brief Account of the Story Hour Conducted by the Children's Department. 1906. 31 pp. 5 cents, postpaid.

Reprinted from the *Monthly Bulletin*, December 1905, with some additional matter in the introduction and an alphabetic index of the books containing the stories, giving the publisher and price of each book.

Annotated Catalogue of Books Used in the Home Libraries and Reading Clubs Conducted by the Children's Department. 1905. 110 pp. 20 cents; postpaid, 25 cents.

Entries are grouped under headings of interest to boys and girls. Contains an author and title index.

Contemporary Biography; References to Books and Magazine Articles on Prominent Men and Women of the Time. Compiled by Agnes M. Elliott. 1903. 171 pp. 20 cents; postpaid, 25 cents.

References to material in this Library on 350 contemporary writers, painters, sculptors, musicians, actors, clergymen, scientists, statesmen, sovereigns, social reformers, etc.

Printed Catalogue Cards for Children's Books; an Announcement: Together with a List of 1,053 Children's Books Agreed upon by the Cleveland Public Library and the Carnegie Library of Pittsburgh. 1903. 30 pp. 2 cents, postpaid.

Reprinted from the *Monthly Bulletin*, January 1903, for the information of prospective buyers of the printed cards. The selection of books on the list was made with the utmost care and is based on the experience of the two collaborating libraries.

Story Telling to Children from Norse Mythology and the Nibelungenlied; References to Material on Selected Stories, together with an Annotated Reading List. 1903. 48 pp. 15 cents; postpaid, 20 cents.

Annual Reports, 1st-11th. 1897-1907. Free.

Except the 3d and 6th, which are out of print.

Circular of Information Concerning the Training School for Children's Librarians, 3d-7th Year. 1903-1907. Free.

The circulars for the 1st and 2d years are out of print.

Monthly Bulletin. (Not published in August and September.) Subscription for a year, 25 cents, postpaid.

Free at the Library.

July 13, 1908.

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FLOODS AND FLOOD PROTECTION

(SUPPLEMENT)

REFERENCES TO BOOKS AND MAGAZINE ARTICLES

Reprinted from the Monthly Bulletin, October 1911



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1911

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Floods and Flood Protection (Supplement)

This list supplements one published under the same title in July 1908. It includes all material on flood protection added to the Library between the former date and October 1911. In scope and arrangement it is similar to the previous list. In titles and quotations the spelling of the original has been followed in each case.

There is also much valuable information on surface water-supply, stream flow, measurement and drainage basins in the publications of the United States geological survey—Annual reports, Bulletins and particularly the Water-supply papers.

The following abbreviations have been used:

diag.	diagrams.	pl.	plates.
dr.	drawings.	ser.	series.
ill.	illustrations.	v.	volume.
no.	number.	w.	words.
p.	page or pages.		

Forest Influence

Beardsley, R. C.

Forests and stream flow. 2 diag. 2,000 w. 1910. (In Engineering news, v.63, p.255.)

Letter criticizing report of National Conservation Commission in "Water-supply paper" 234 of the United States geological survey. Author dissents from the opinion that floods are due to deforestation and believes that an important cause of floods is the drainage of swamps.

Castle, Mildred A. *tr.*

Effect of the forest upon waters. 9 p. 1910. (In American forestry, v.16, p.156.)

Translated from "Revue des eaux et forets," Jan. 1, 15, 1909.

Results of American and European researches, discussing papers at Eleventh International Congress of Navigation at Milan, 1905, and other literature. Bibliographic foot-notes.

Chittenden, Hiram Martin.

Forests and floods; extracts from an Austrian report on floods of the Danube, with applications to American conditions. 6,400 w. 1908. (In Engineering news, v.60, p.467.)

Discussion of paper by Ernst Lauda, chief of the hydrographic bureau of the Austrian government. Lauda's paper "gives the most complete chronological record of the Danube floods that has ever been prepared for that or probably any other stream."

Chittenden, Hiram Martin, and others.

Forests and reservoirs in their relation to stream flow, with particular reference to navigable rivers, with discussion by F. Collingwood [and others]. 300 p. Ill. 1909.

Reprinted from the "Transactions of the American Society of Civil Engineers," v.62, The same. 1909. (In Transactions of the American Society of Civil Engineers, v.62, p.245.)

"Municipalities like Pittsburgh, Cincinnati and Kansas City, must look in the main to their own efforts for protection against floods. In particular, they must reject absolutely the delusive promises of forestry." Conclusion, p.315.

Chittenden, Hiram Martin.

Forests, stream flows and storage reservoirs. 500 w. 1908. (In Engineering news, v.60, p.564.)

Letter in support of article in "Engineering news," v.60, p.467.

Fenn, F. A.

The national forests. 900 w. 1910. (In American forestry, v.16, p.187.)

General discussion of national forests and stream protection. Author is a supervisor in the United States forest service.

Finney, John H.

Connection between forests and streams. 1,000 w. 1910. (In American forestry, v.16, p.109.)

Criticism of Moore's conclusions by secretary of the Appalachian National Forest Association.

Forests and streamflow. 3,500 w. 1911. (In American forestry, v.17, p.403.)

Discusses recent literature on this subject, and describes briefly the experimental station at Wagon Wheel Gap in the Rio Grande national forest. This station is to be controlled jointly by the Forest service and the Weather bureau, the object being to determine the effect of forest cover upon high and low water stages of mountain streams, the run-off of mountain watersheds as compared with annual precipitation and the erosion of the surface of the watershed. The only similar experiments heretofore made have been in Switzerland.

Glenn, L. C.

Forests as factors in stream flow. 3,000 w. 2 ill. 1910. (In American forestry, v.16, p.217.)

Hall, William L. & Maxwell, Hu.

Surface conditions and stream flow. 16 p. 1910. (United States—Forestry bureau. Circular 176.)

The same, abstract. 3,500 w. 1911. (In American forestry, v.17, p.371.)

Study of the tendency toward increased floods and the causes, considering precipitation, evaporation, temperature, topography and geology, natural and artificial reservoirs, soil, ground cover, and general watershed conditions. States that "undoubtedly it is the clearing away of the forest on the mountainous watersheds of the streams...described that has caused the great increase in frequency and duration of floods."

Harts, William W.

Relation of forests to stream flow. 2,500 w. 1910. (In Engineering news, v.63, p.245.)

From "Professional memoirs," Engineer bureau, United States army, Oct.—Dec. 1909.

Careful study of record relating to the two principal rivers under author's supervision: the Cumberland and the Tennessee. These records cover approximately 40 years and author claims there is but slight indication of the influence of forests and the little evidence found is adverse to the forests.

Moore, Willis L.

Report on the influence of forests on climate and on floods. 38 p.
2 diag. 3 charts. 1910.

Report to Committee on agriculture of the House of representatives.

The same, condensed. 10,000 w. (In *Engineering news*, v.63, p.245.)

Conclusions

"(1) Any marked climatic changes that may have taken place are of wide extent and not local, are appreciable only when measured in geologic periods, and evidence is strong that the cutting away of the forests has had nothing to do with the creating or the augmenting of droughts in any part of the world.

(2) Precipitation controls forestation, but forestation has little or no effect upon precipitation.

(3) Any local modification of temperature and humidity caused by the presence or absence of forest covering, the building of villages and cities, etc., could not extend upward more than a few hundred feet, and in this stratum of air saturation rarely occurs, even during rainfall, whereas precipitation is the result of conditions that exist at such altitudes as not to be controlled or affected by the small thermal irregularities of the surface air.

(4) During the period of accurate observations, the amount of precipitation has not increased or decreased to an extent worthy of consideration.

(5) Floods are caused by excessive precipitation, and the source of the precipitation over the central and eastern portions of the United States is the vapor borne by the warm southerly winds from the Gulf of Mexico and the adjacent ocean into the interior of the country, but little from the Pacific Ocean crossing the Rocky mountains.

(6) Compared with the total area of a given watershed, that of the headwaters is usually small, and except locally in mountain streams, their run-off would not be sufficient to cause floods, even if deforestation allowed a greater and quicker run-off. Granting for the sake of argument that deforestation might be responsible for general floods over a watershed, it would be necessary, in order to prevent them, to reforest the lower levels with their vastly greater areas, an impossibility unless valuable agricultural lands are to be abandoned as food-producing areas.

(7) The run-off of our rivers is not materially affected by any other factor than the precipitation.

(8) The high waters are not higher, and the low waters are not lower than formerly. In fact, there appears to be a tendency in late years toward a slightly better low-water flow in summer.

(9) Floods are not of greater frequency and longer duration than formerly."

Relation of forests to stream flow. 2,500 w. 1908. (In *Engineering news*, v.60, p.478.)

Editorial discussion of Chittenden's papers in "Engineering news," v.60, p.467, and in "Transactions of the American Society of Civil Engineers," v.62, p.245.

Report of Mr Moore. 700 w. 1910. (In *American forestry*, v.16, p.184.)

Editorial, criticizing views of Moore.

Roth, Filibert.

Appalachian forests and the Moore report. 3,200 w. 3 ill. 1910. (In *American forestry*, v.16, p.209.)

Author is professor of forestry in University of Michigan.

Criticism of Moore's report to Committee on agriculture.

Rothrock, Joseph T.

Some observations on forests and water-flow. 1,200 w. 1910. (In *American forestry*, v.16, p.349.)

Discussion of influence of forests on water flow during winter, claiming that the effect is to retard run-off. Refers to report by Moore.

Seely, Leslie B.

Some problems of forestry. 9,000 w. 1909. (In *Journal of the Franklin Institute*, v.168, p.1.)

Discusses influence of forests on general precipitation, influence on drainage, etc. Gives results of observations in India, in Bohemia and in California. These observations, however, cover only brief periods. Attributes both drought and floods largely to deforestation. Characterizes Pittsburgh as the "flood city."

Swain, George F.

Influence of forests on climate and on floods. 7,000 w. 2 ill. 1910.
 (In American forestry, v.16, p.224.)

See also note, p.315.

The same. (In Engineering news, v.63, p.427.)

Author is professor of civil engineering, Harvard University.

Lengthy criticism of Moore's report to the Committee on agriculture of the House of representatives. Author believes that deforestation unquestionably "increases the number and suddenness of floods, diminishing also their duration."

Wilson, Elwood.

Relation of forests to stream flow in Quebec. 300 w. 1908. (In Engineering news, v.60, p.564.)

Letter differing with conclusions of Chittenden in his article in "Engineering news," v.60, p.467.

Sanitation

Cleansing and disinfecting dwellings after the Paris floods. 300 w. 1910. (In Engineering news, v.63, p.352.)

Translated from "La Technique sanitaire," Feb. 1910.

American River Floods**Mississippi****[Brown, C. W.]**

Protection and drainage of lands subject to overflow. 3,100 w. 1910.
 (In Engineering record, v.61, p.254.)

Abstract of paper before Illinois Society of Engineers and Surveyors.

Special attention to drainage projects of large magnitude in the Mississippi valley. Run-off from high lands which naturally passes across the drainage area, must be computed but should be diverted if possible. Diverting channels should be provided with settling basins of large area. Velocity during sedimentation should not exceed 0.3 to 0.4 feet per second. Author estimates for handling one-half of mean annual rainfall as seepage from the soil and other half as a mean monthly discharge. Levees should be carried 2 to 5 feet above highest recorded flood stage. Slopes are given for various materials. Cost of improvement must not exceed \$20 to \$30 per acre if land owners are to be induced to unite in the scheme.

Pickett, William D.

Floods of the Mississippi delta; their causes, and suggestions as to their control. 20 p. 1909. (In Transactions of the American Society of Civil Engineers, v.63, p.53.)

Area of the delta is over 30,000 sq. mi. 65 per cent. of which is "overflow" land. "There is no relief to be expected from the Ohio. It is left, then, to the Missouri watershed to furnish the means for the object required. The head waters of this stream must be impounded in immense reservoirs for such a length of time as will without doubt prevent the 'June rise' from making its advent until the 'spring rise' has passed."

Price, W. G.

Note on the improvement of the Mississippi river. 1,000 w. 1908. (In Transactions of the American Society of Civil Engineers, v.60, p.339.)

With discussion.

Remarks on bank revetment. "The writer believes that the power of the flowing water in any silt and debris-bearing stream can be utilized and directed by a properly designed structure, so that it will dig a permanent foundation for such a structure."

United States—Engineers corps.

Report by a special board of engineers on survey of Mississippi river from St. Louis, Mo. to its mouth, with a view to obtaining a channel 14 feet deep and of suitable width, including a consideration of the survey of a proposed waterway from Chicago, Ill. to St. Louis, Mo. heretofore reported upon. 2v. 1909.

v.1. Text. 532 p. with maps and diagrams.

v.2. Atlas. 52 large plates.

Winslow, Eveleth E.

Résumé of the operations in the first and second districts, Mississippi river improvement, 1882-1901, with supplement containing plates 1 to 73. 296 p. 13 ill. 1910. (In United States—Engineer school. Occasional papers, no. 41.)

First district extends from Cairo to the foot of Island 40, a distance of about 220 miles. Second district extends from the foot of Island 40 to the mouth of White river, a distance of about 175 miles.

Describes in detail contraction works and bank revetment and arrives at the following conclusions: "That the banks of the river can be successfully revetted; that side chutes can be successfully closed and that the river can be otherwise contracted where necessary; that these works both of revetment and contraction will be expensive; that an efficient and permanent regulation is not possible except by bank revetment, but that contraction will also be necessary in places; that...in general the full results of work of either class will not be shown for several seasons; that the permanency of location will be more easily obtained the greater the curvature of the bends and the more regular the curvature; that in systematic regulation the work should start at the head of a reach and should proceed regularly downstream and that in general the complete regulation of the river will be a work of vast magnitude that would at best extend over a long series of years."

Ohio**United States—Engineers corps.**

Ohio river; letter from the secretary of war transmitting, with a letter from the chief of engineers, report of a board of engineers on an examination of the Ohio river with a view to obtaining channel depths of 6 and 9 feet respectively. Ill. 1908. (60th cong. 1st sess. House. Doc. v.17.)

Numerous maps and diagrams, including 29 folding plates.

Miscellaneous**Bixby, Gen. William H.**

River and harbor improvements under the corps of engineers, United States army. 10,000 w. 1910.

Pamphlet. Reprint of address delivered before National Rivers and Harbors Congress held at Washington, D. C. Dec. 8, 1910. Speaks of limitations imposed on Engineer department and the necessity hitherto of restricting the work to navigation interests. Recognizes importance of bank protection, levee construction and reclamation and calls attention to the fact that present and future investigations are to include consideration of water-power developments wherever cost of navigation improvement may be lessened thereby.

Eastern United States**Ayres, Philip W.**

Commercial importance of the White mountain forests. 32 p. 1909. (United States—Forestry bureau. Circular 168.)

Discusses at some length the influence on water-power and on navigation, claiming that forest removal increases floods and that for securing uniformity of stream flow "forest preservation over wide areas, and especially on steep slopes is the only sure dependence."

Hartford, Conn.

Report of the joint special committee of the court of common council on East side flood protection, and that of city engineer Frederick L. Ford upon (1) a general plan for the abatement of the nuisance caused by freshets in the Connecticut river; (2) the improvement of sewerage facilities in the Colt meadow district; (3) the future disposal of sewage from the Franklin avenue sewerage district: submitted to the court of common council on Oct. 12, 1908, Feb. 23 and March 8, 1909. 89 p. 10 ill. 12 folding pl. 1909.

Two methods are applicable "(1) Completion of the dyking around the unprotected area. (2) Raising of the entire inundated district." The former scheme is favored in the present report, as has been the case also in previous reports of engineers and committees, extending over almost half a century. Former reports have disagreed as to location and height of proposed dike. Present committee looks with disfavor on the scheme for raising the flooded area, on account of the expense and the difficulty of securing cooperation of the property owners. Report includes careful study of rainfall and stream measurement and gives estimates of cost.

Knowles, Morris, & Lehman, G. M.

Forest reserves in Appalachian mountains; report of special committee attending hearing before House committee on agriculture to the Chamber of Commerce of Pittsburgh. 8 p. 1908.

Has reference to bill "For acquiring natural forests in the southern Appalachian and White mountains." Authors of this report submitted evidence showing increasing tendency to flooding of the Pittsburgh region, and in their conclusion strongly recommended support of the bill.

Pennsylvania—Water supply commission.

Report. 1905-1908.

Partial contents: 1907: Water companies.—Obstructions to streams.—Hydrographic features of Pennsylvania.—Deforestation and its effects on stream flow.—Stream flow.—Floods.—Water power.—1908: Inactive water companies.—Obstructions to streams.—Methods of bank protection.—Rainfall.—Droughts.—Floods during 1908.—Report of the engineer of the commission upon the causes and methods of relief from floods in Turtle creek, Westmoreland and Allegheny counties.

Pittsburgh—Flood commission.

Flood commission of Pittsburgh, organized to investigate and find means for protection against floods. 8 p. [1909.]

Pamphlet explaining object of the commission, summarizing extent of floods and presenting preliminary recommendations.

Riegel, R. M.

Paxton creek flood controlling works, Harrisburg, Pa. 3,800 w. 4 dr. 3 ill. 1910. (In Engineering news, v.63, p.196.)

From "Cornell civil engineer," Oct. 1909.

Stream with drainage area of about 23 sq. mi. Control work begun May 1908; finished Jan. 1909. Two floods have since occurred without causing trouble. Scheme provides protection by diversion to Susquehanna river through large flood channel, with additional provision of a reservoir with storage capacity sufficient to carry the peak of the maximum flood expected. Construction costs are given.

Western United States

Flood protection along Cherry creek in Denver, Colo. 1,400 w. 3 dr. 1908. (In Engineering record, v.57, p.175.)

Tributary of South Platte river. Fall about 30 ft. per mile.

Describes two continuous reinforced concrete retaining walls erected to form a new channel, with a uniform width of 80 ft. and a minimum depth of 8 ft.

Flood protection in Grand Rapids, Mich. 5,400 w. 2 dr. 3 ill. 1908.
(In Engineering record, v.58, p.495.)

Project includes extensive channel and shore improvement and will create a valuable water-power. Involves expenditure of \$1,000,000 for flood protection with \$500,000 additional for sewers.

Foote, A. D.

Redemption of the great valley of California. 18 p. 1 map. 2 dr. 1910. (In Transactions of the American Society of Civil Engineers, v.66, p.229.)

Discussion, 35 p.

The same, abstract. 4,000 w. 1 map. (In Engineering news, v.62, p.647.)

Scheme combining flood prevention and land fertilization by basin irrigation. Includes Sacramento, San Joaquin, Tulare and Kern valleys, and the bordering foot-hills. Proposes dividing up entire alluvial area of the valleys into basins (10 to 20 miles long and 1 to 3 miles wide) by means of dikes parallel to the general land contours. During high water these basins are to be filled to a depth of several feet, thus affording a large storage capacity, securing irrigation and deposition of silt. Drainage is to be effected by channels paralleling the river on either side. Channel openings to be controlled by gates, more complete water distribution secured by movable dams, and inflow of mining waste prevented by debris barriers at intervals along the mountain streams.

"Flood capacity of the river and escape channels would be somewhat more than 100,000 cu. ft. per sec. more than was ever required in the valley...It will take a number of years to complete the scheme and may require \$75,000,000."

Olesen, J. Y.

Flood protection in the Kansas river valley at Kansas City. 3,000 w. 3 diag. 1 map. 1909. (In Engineering news, v.62, p.82.)

Watershed is 60,000 sq. mi., and channel at mouth can carry only 0.1 in run-off per day from this area or 150,000 cu. ft. per sec. without danger of overflow. A drainage district has been established and will follow substantially the protective measures recommended by a board of army engineers in 1904, as follows: (1) Banks for a distance of 17,000 ft. above mouth to be protected by solid concrete walls, 30 ft. high above mean low water, resting on piles driven to bed rock; (2) Width between tops of walls 734 ft.; (3) River bed to be dredged free of all solid obstructions, 15 ft. below low water, thus allowing silt to be carried out by scour at high velocity of flood water; (4) All bridges limited to two piers 300 ft. c. to c.; (5) Above the 17,000 ft. limit earth embankments protected by riprap; (6) Levee and bank revetment along right bank of the Missouri.

Robinson, H. F.

Report of the flood on the Zuni river, Sept. 6, 1909. 1,000 w. 1 map. 1 table. 1910. (In Engineering news, v.64, p.203.)

Partial failure of Zuni dam, through undermining by passage of water beneath a lava cap which extended under spillway. Resulted in settling of from 4 to 9 feet and leakage of 5,000 cu. ft. per sec. Drainage area above dam is 650 sq. mi. at elevations varying from 6,300 ft. at reservoir to 9,200 ft. on mountain tops.

Stevens, John C.

Water powers of the Cascade range; pt.1, southern Washington. 94 p. 3 diag. 21 pl. 1910. (United States geological survey. Water-supply paper 253.)

Considers at some length the variations in stream flow and more briefly conditions affecting stream flow, and floods.

United States—Engineers corps.

Sacramento river, California; reports of examination and survey of Sacramento river, California, from its mouth to Feather river. 19 p 1908. (60th cong. 2d sess. House. Doc. v.24.)

Brief report with 26 maps. Includes estimates of cost of improvements.

United States—Engineers corps.

San Joaquin river, Stockton channel, etc. from San Francisco bay to Stockton, Cal.; reports of examination and survey. 18 p. 1908. (60th cong. 2d sess. House. Doc. v.25.)

Brief report with 17 maps. Includes estimates of cost of projects for improvement of navigation.

Other Rivers**Campbell, R. E.**

Forests of Canada in relation to the water supply. 10 p. 1909. (In Official proceedings of the National Irrigation Congress, v.17, p.102.)

Deals with a district in which the rivers and streams are subject to sudden floods, often disastrous. As a move towards control of flood waters an examination is [1909] being made of possible reservoir sites on some of the main streams. Claims that forests "have a...beneficial regulative effect on the stream flow."

Conway, G. R. G.

Recent floods at Monterrey, N. L., Mexico. 2,200 w. 1 diag. 1 dr. 5 ill. 2 maps. 1909. (In Engineering news, v.62, p.315.)

Description of a disastrous flood with records of rainfall and run-off.

Lewis, Samuel J.

The Monterey flood and San Luisito bridge. 1,800 w. 4 ill. 1 map. 1909. (In Mining and scientific press, v.99, p.494.)

Flood in Santa Catarina river, Aug. 27, 1909. Drainage area is 2,000,000 acres, probably less than 10 per cent. being covered with soil and vegetation. Conditions of rainfall and run-off are easily determined, but were not considered in construction of the bridge destroyed in this flood.

Foreign River Floods**Austrian****Lauda, Ernst.**

Das generelle regierungsprojekt für die ergänzung der hochwasserschutzmassnahmen in der Wiener Donaustromstrecke. 7,500 w. 17 diag. 1 dr. 2 tables. 1910. (In Zeitschrift des österreichischen ingenieur- und architekten vereins, v.62, p.473.)

Lauda, Ernst.

Schutz von Wien gegen die hochwasser der Donau. 7,500 w. 5 diag. 5 ill. 11 tables. 1910. (In Zeitschrift des österreichischen ingenieur- und architekten vereins, v.62, p.457.)

Lauda, Ernst.

Schutz von Wien gegen die hochwassergefahren der Donau. 2,000 w. 5 diag. 1 table. 1910. (In Zeitschrift des österreichischen ingenieur- und architekten vereins, v.62, p.772.)

Singer, Max.

Über flussregime und talsperrnenbau in den Ostalpen. 16,500 w. 2 diag. 6 dr. 6 ill. 1909. (In Zeitschrift des österreichischen ingenieur- und architekten vereins, v.61, p.797, 813.)

Waldvogel, Anton.

Wien von den hochfluten der Donau dauernd bedroht. 9,000 w.
12 diag. 4 dr. 6 ill. 6 maps. 1910. (In Zeitschrift des österreichischen
ingenieur- und architekten vereins, v.62, p.497, 765.)

Discussion, 20,000 w. 7 dr. 1 map.

Outlines history of Danube floods, shows Vienna's danger and discusses protective
measures.

British**England—Royal commission on canals and waterways.**

Report (1st-4th), 1906-II. v.1-12.

v.1. Minutes of evidence and appendices thereto accompanying the first report.
470+111 p. 1906. Map of the canal systems and navigable rivers of England and Wales.
v.2. Ireland. 321+54 p. 1907. Map of the canal systems and navigable rivers of
Ireland.

v.3. England and Wales and Scotland. 643+217 p. 1908. Map of the canal sys-
tems and navigable rivers of Scotland.

v.4. Returns, comprising the history, the extent, the capital of and the traffic and
works on the canals and inland navigations of the United Kingdom. 510 p. 1908.
Tables showing length, number of locks, number of tunnels, etc., in respect of each
canal or navigation in England, Ireland, Scotland and Wales.

v.5. England and Wales and Scotland. 388+79 p. 1909.

v.6. Foreign inquiry; report on the waterways of France, Belgium, Germany and
Holland. 223 p. Numerous maps and tables.

v.7. Final report, England and Wales and Scotland. 237+29 p. 1909.

v.8. Appendices to the fourth and final report, England and Wales and Scotland.
247 p. 1910.

v.9. Reports...on the cost of improving canal routes. 214 p. 1910. Includes
statistical surveys of canal routes and many drawings showing longitudinal sections of
canal routes.

v.10. Reports on the water supplies of canal routes. 241 p. 1911. Numerous
diagrams, longitudinal sections and plans of routes showing existing canals, proposed
alterations, sources of water-supply, reservoirs, streams and pumping stations and par-
ticulars of the catchment areas and rainfall stations.

v.11. Final report on the canals and inland navigations of Ireland. 91 p. 1911.
Discusses history and present condition, reasons for non-improvement by private enter-
prise, question of extensions and improvements, recommendations as to improvement and
control.

v.12. Appendices to the final report on the canals and inland navigations of Ire-
land. 37 p. 1911.

Exhaustive study of the waterways of the United Kingdom, and of considerable
interest even though not dealing directly with flood prevention.

French**Dumas, A.**

Crue de la Seine, de janvier 1910. 9,000 w. 4 diag. 2 dr. 19 ill.
3 maps. 1910. (In Génie civil, v.56, p.257.)

Reviews history of the flood and gives measurements of recent and former floods.

Dumas, A.

Effets de la crue de la Seine du 28 janvier 1910 dans Paris et sa
banlieue. 7,500 w. 5 diag. 4 dr. 10 ill. 2 maps. 1910. (In Génie civil,
v.56, p.397.)

Descriptive article dealing with temporary and permanent effects.

Dumas, A.

Rapport de la commission chargée de rechercher les causes des in-
ondations et les moyens d'en empêcher le retour. 7,000 w. 2 diag.
1 map. 1910. (In Génie civil, v.56, p.283.)

Review of an extensive report, embodying 20 questions to be referred to experts,
either members of the commission or sub-committees.

Engineering features of the recent floods in Paris. 4,500 w. 1 diag. 1 dr. 6 ill. 1 map. 1910. (In *Engineering news*, v.63, p.327.)
 Causes, effects and descriptive data.
 Editorial, 400 w., p.343.

Floods in the Seine. 3,500 w. 1 map. 1910. (In *Engineering*, v.89, p.149.)
 Comparison of recent and former floods. Conditions and causes of flood of Jan. 1910.

Great Paris flood. 500 w. 14 ill. 1910. (In *Scientific American supplement*, v.69, p.129.)

Descriptive article reprinted from "New York Sun."

Miller, Warren H.

Fighting the Paris flood. 2,900 w. 4 ill. 1910. (In *Engineering record*, v.61, p.240.)

Description of the flood of Jan. 1910, the most destructive in the history of Paris and the highest since 1658. Briefly outlines precautionary measures during flood stage.

Moore, Barrington.

Checking floods in the French Alps. 2,300 w. 9 ill. 1910. (In *American forestry*, v.16, p.199.)

Describes and illustrates work of barrage construction in mountain streams, and of gradual reforestation of mountain slopes.

[**Paris flood.**] 600 w. 1910. (In *Engineering news*, v.63, p.133.)

Discussion of flood of Jan. 1910.

Paris floods and their prevention. 400 w. 1910. (In *Scientific American supplement*, v.69, p.217.)

Popular review of proposed work.

Proposed structures to prevent future damage from floods at Paris. 400 w. 1910. (In *Engineering news*, v.64, p.91.)

Abstract of report of the commission of engineers appointed following the flood of Jan. 1910. Proposes a thorough study of entire drainage area of the Seine; treatment of Seine channel and banks through Paris; raising of certain quay walls two feet above flood height of 1910; construction of sewer valves; thorough waterproofing of subways; and construction of by-pass canal to carry part of flood water around the city. Reforestation is discussed and considered advisable.

Roberts, Thomas P.

Floods in the river Seine; remarks on proposed means to mitigate flood conditions at Paris. 20 p. 1 map. 1910. (In *Proceedings of the Engineers' Society of Western Pennsylvania*, v.26, p.25.)

With discussion.

Considers soil conditions and other features of the Seine basin, giving some comparison with American streams. Offers suggestions for ameliorating flood conditions, but makes no definite recommendations. Mentions raising level of city, deepening and straightening of channel, etc.

Das Seine-Hochwasser in Paris vom Jänner 1910. 2,000 w. 2 diag. 1 map. 2 tables. 1910. (In *Zeitschrift des österreichischen ingenieur- und architekten vereins*, v.62, p.174.)

Description and comparison with other Seine floods.

Soper, George A.

Water supply, sewerage and subways of Paris in relation to the present floods. 6,000 w. 8 dr. 4 ill. 1910. (In *Engineering news*, v.63, p.144.)

Considers hydrology of the Seine, subterranean structures, population and city plan, dual water-supply, sewers, sewage farms, subways and danger of epidemic.

Editorial, 600 w., p.133.

German**Beyerhaus, Eduard.**

Der Rhein von Strassburg bis zur holländischen grenze in technischer und wirthschaftlicher beziehung. 128 p. 7 folding pl. 1902.

Describes the regulation work done on the Rhine and the various harbors established. Statistical information concerning freight handled, number of vessels employed, etc. is given, together with a discussion of the influence of the river on the industrial life of the district. Numerous maps and plans are included.

Intze, O.

Talsperrenanlagen in Rheinland und Westfalen, Schlesien und Böhmen. 48 p. 4 dr. 13 ill. [1904?]

Pamphlet describing exhibit of Königlich preussischen ministeriums der öffentlichen arbeiten, at St. Louis Exposition, 1904. Deals with work since 1889.

Keller, Hermann, ed.

Memel-, Pregel- und Weichselstrom; ihre stromgebiete und ihre wichtigsten nebenflüsse; eine hydrographische, wasserwirthschaftliche und wasserrechtliche darstellung; im auftrage des preussischen wasser-ausschusses hrsg. 6v. 1899. Reimer.

- v.1. Stromgebiete und gewässer.
- v.2. Memel- und Pregelstrom.
- v.3. Weichselstrom in Schlesien und Polen.
- v.4. Weichselstrom in Preussen.
- v.5. Tabellenband.
- v.6. Kartenbeilagen.

Very complete study of physical and economic conditions in the drainage basins of these rivers. Statistical, meteorological and hydrographic data are tabulated and numerous large hydrographic, geological and economic charts are included.

Keller, Hermann, ed.

Weser und Ems; ihre stromgebiete und ihre wichtigsten nebenflüsse; eine hydrographische, wasserwirthschaftliche und wasserrechtliche darstellung; im auftrage des preussischen wasser-ausschusses hrsg. 6v. 1901. Reimer.

- v.1. Stromgebiete und gewässer.
- v.2. Quell- und nebenflüsse der Weser (ohne Aller).
- v.3. Die Weser vom Münden bis Geestemünde.
- v.4. Die Aller und die Ems.
- v.5. Tabellenband.
- v.6. Kartenbeilagen.

Thorough study of hydrographic conditions in their drainage basins and of their effect on the industrial development of the region. Statistical data of a hydrographic and meteorological nature are tabulated and good geological and hydrographic maps and charts are included.

General**Davis, Arthur P.**

National irrigation and flood control. 1,600 w. 1908. (In Engineering record, v.58, p.554.)

By chief engineer United States reclamation service. Gives brief data on 27 projects in course of construction, 20 of which provide flood storage.

Flamant, and others.

Préservation des basses régions contre l'envahissement des eaux. 30 p. 1909. (In Annales des ponts et chaussées, mémoires, septembre-octobre 1909, ser.8, v.41, p.91.)

Report at Eleventh International Congress of Navigation, St. Petersburg, 1908. Discusses at some length the reports of Kvassay for Austria-Hungary, Ockerson for the United States, Troté for France, Rytel for Russia and a general report by Golovnine.

Holliday, Alex R.

Control of flood water at a small reservoir. 600 w. 2 dr. 1908. (In *Engineering news*, v.60, p.152.)

Methods applicable to diversion of storm water on small scale.

La Brosse, R. de.

Dispositions à donner aux barrages des rivières à grandes variations de débit et eventuellement à fort charriage de glaces, de manière à menager les intérêts de la navigation et de l'industrie. 36 p. 1909. (In *Annales des ponts et chaussées, mémoires*, mai-juin 1909, ser.8, v.39, p.129.)

Report at Eleventh International Congress of Navigation at St. Petersburg, 1908. Discusses seven reports on above subject, including one for the United States by Maj. W. L. Sibert.

Liability of city confining flood waters within banks of stream. 150 w. 1910. (In *Engineering news*, v.64, p.485.)

Note from "Case and comment," Oct. 1910. Recent Iowa decision (*Walters v. Marshalltown*, 120 N. W. 1046) holding that a municipality having raised a street grade so as to confine flood water of a stream to the channel, is not liable for damage thereby inflicted upon lower riparian property.

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Debate Index. 1911. 75 pp. 15 cents; postpaid, 20 cents.

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†Lives and Letters; a Selected and Annotated List. 1910. 36 pp.
10 cents, postpaid.

Reprinted from the *Monthly Bulletin*, March 1910.

†Gift of the German Emperor [List of Books, Maps and Photographs]. 1908. 17 pp.

Reprinted from the *Monthly Bulletin*, April 1908.

†Letters of General Forbes; Reprint of 35 Letters Relating to the Expedition against Fort Duquesne. 63 pp. 20 cents, postpaid.

In the *Monthly Bulletin*, February, March, April, May, 1909. Not issued in separate form.

†Index to Subject Catalogue of the Technology Department. 1909. 50 pp. 10 cents, postpaid.

Index to Proceedings of the Engineers' Society of Western Pennsylvania, Volumes 1 to 20, 1880-1904. Compiled by Harrison W. Craver. 1906. 144 pp. \$1.00, postpaid.

Catalogue of Books in the Childrens Department of the Carnegie Library of Pittsburgh. 1909. 604 pp. 75 cents; postpaid, \$1.00.

Catalogue of Books, Annotated and Arranged, and Provided by the Carnegie Library of Pittsburgh for the Use of the First Eight Grades in the Pittsburgh Schools. 1907. 331 pp. 35 cents; postpaid, 50 cents.

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Annotated Catalogue of Books Used in the Home Libraries and Reading Clubs. 1905. 110 pp. 20 cents; postpaid, 25 cents.

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In the *Monthly Bulletin*, July 1906.

Contemporary Biography. 1903. 171 pp. 20 cents; postpaid, 25 cents. References on 350 contemporary writers, painters, sculptors, musicians, actors, clergymen, scientists, statesmen, sovereigns, social reformers, etc.

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- †*Electric Driving in Rolling-mills and Foundries.** 11 pp. 5 cents, postpaid.
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- Pennsylvania;** a Reading List for the Use of Schools, with Special Reference to Indian Warfare and the Local History of Pittsburgh. 1911. 83 pp. 20 cents; postpaid, 25 cents.
- †Story Hour Courses for Children from Greek Myths, The Iliad and The Odyssey.** 1906. 32 pp. 5 cents, postpaid.
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In the *Monthly Bulletin*, April 1906.

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